

## **Chapter Ten: Species Summaries**

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This chapter includes a species summary for each of the 257 Species in Greatest Need of Conservation. Each summary includes the scientific name, common name, federal and state status (if any), a short species description, distribution and abundance (including a map, where possible), description of the habitat, and threats to the species. Proposed strategies for dealing with these threats are included in the habitat summaries in Chapter 9.

## **A. Fishes**

## American Brook Lamprey (*Lampetra appendix*, State Threatened)

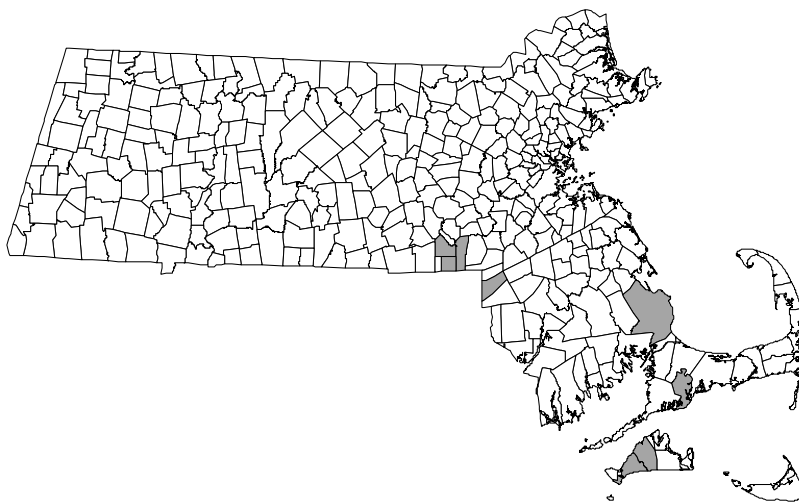
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1	Small Streams	State List; NE F&W Agencies

### Species Description

The American Brook Lamprey is a primitive, eel-like fish that lacks jaws, scales, paired fins, and bones. It has a cartilaginous skeleton, one nostril between the eyes, seven pairs of pore-like gill openings, and seldom grows as large as 8 inches. American Brook Lampreys can live for 4-6 years. The first three to five years are spent as larvae, called *ammocoetes*. At this stage they live in burrows in sandy, mucky substrates and filter-feed on organic detritus. They are toothless, almost blind, and have a fleshy hood around the mouth that is used for filter-feeding. Larval lampreys have eye spots that can only detect light and dark. When they reach a length of a little less than five inches, they stop feeding and begin to metamorphose. This process generally begins in the fall or winter and is completed by the spring spawning season. During this metamorphosis, lampreys change in a few key ways: 1) they become sexually mature; 2) their eyes become truly functional; and 3) their mouths change from a filter-feeding mechanism, to a round, suction disk with horny teeth, called an oral disk.

### Distribution and Abundance

There have been 12 occurrences of American Brook Lamprey in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of American Brook Lamprey

### Habitat Description

American Brook Lampreys live in clear, cool streams. Adults spawn in pea gravel substrates. Larvae live in areas with substrates consisting of fine sand and muck, often in backwaters or stream margins.

### Threats

American Brook Lampreys are vulnerable to sedimentation, water temperature increases, pollutants, and extreme water level changes.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. American Brook Lamprey (*Lampetra appendix*) Fact Sheet.

## Shortnose Sturgeon (*Acipenser brevirostrum*, State Endangered, Federal Endangered)

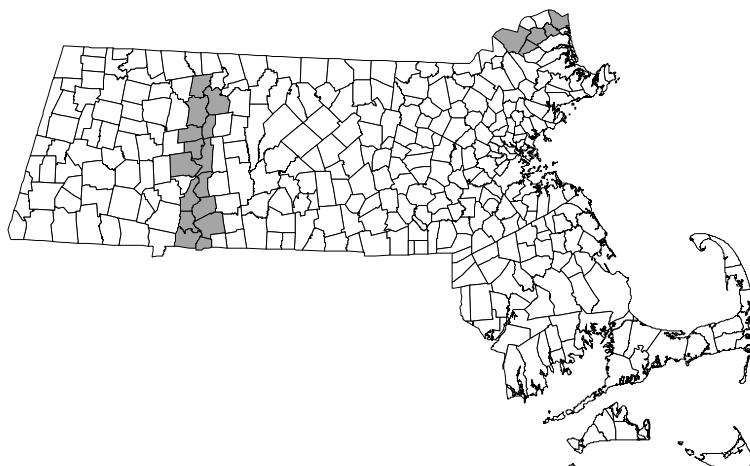
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S1	Connecticut & Merrimack Mainstems, Large & Mid-sized Rivers, Marine & Estuarine Habitats	Federal List; State List; Globally Rare

### Species Description

The Shortnose Sturgeon is one of the smallest species of sturgeons, rarely exceeding about 3 feet in length. Adults possess a short, blunt, rounded snout with the mouth on the ventral side. They have five rows of bony plates called scutes along the body. Modified armored scales on the head give it a skull-like appearance. The Shortnose Sturgeon has a yellow-brown to blackish-olive dorsal surface, pale-colored scutes, and a white underside.

### Distribution and Abundance

There have been three occurrences of the Shortnose Sturgeon in Massachusetts documented since 1980 (NHESP database, accessed December, 2004). The occurrence in the Connecticut River downstream of the Holyoke Dam has not been observed spawning since the late 1980s.



Massachusetts Towns with Recent Occurrences of Shortnose Sturgeon

### Habitat Description

The Shortnose Sturgeon is an anadromous species, which spawns in freshwater but typically enters saltwater for part of its life. In Massachusetts, populations of this species are mostly riverine, although estuaries and coastal areas are often used during the winter months. One occurrence appears to be entirely landlocked, however, and appears to complete its entire life history within a dam-enclosed reach of the Connecticut River. Spawning takes place in fast-flowing, rocky areas in rivers; feeding is typically in areas containing aquatic vegetation. There are three Massachusetts occurrences of Shortnose Sturgeon: one in the Merrimack River and two in the Connecticut River.

### Threats

Habitat degradation or loss is the main threat to this species. These can occur due to dams, bridge construction, channel dredging, impingement on water intake screens, and pollution. Shortnose Sturgeon are particularly vulnerable to these threats because they mature and spawn at a relatively late age, and because they undergo large movements to get to critical habitats.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Shortnose Sturgeon (*Acipenser brevirostrum*) Fact Sheet.



## Atlantic Sturgeon (*Acipenser oxyrinchus*, State Endangered)

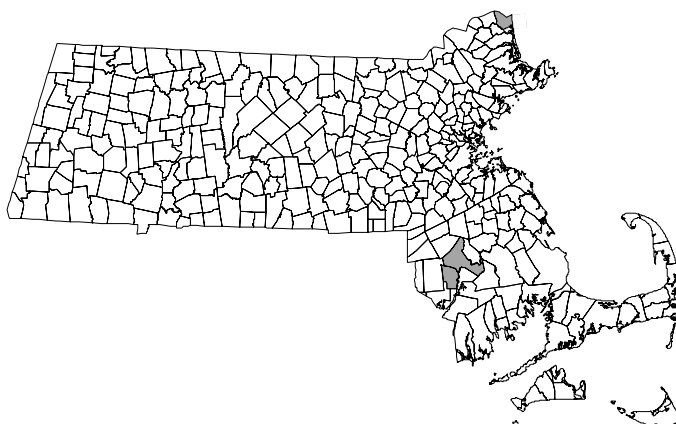
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S1	Connecticut & Merrimack Mainstems; Large & Mid-sized Rivers, Marine & Estuarine Habitats	State List; Globally Rare; NE F&W Agencies

### Species Description

The Atlantic Sturgeon is a very large, prehistoric-looking fish, averaging 6-9 feet in length, and sometimes exceeding 13 feet and a weight of 800 pounds. Atlantic Sturgeon have five rows of well-developed, overlapping body plates called scutes. They have a long, pointed snout and a narrow, subterminal mouth.

### Distribution and Abundance

There have been two occurrences of Atlantic Sturgeon in Massachusetts documented since 1980 (NHESP database, accessed December, 2004). Current spawning has not been documented for either occurrence. The National Marine Fisheries Service is currently conducting a status review of Atlantic Sturgeon to determine if listing under the federal Endangered Species Act is warranted.



Massachusetts Towns with Recent Occurrences of Atlantic Sturgeon

### Habitat Description

The Atlantic Sturgeon is an anadromous fish, spawning in freshwater and spending much of its adult life in estuarine or coastal habitats. In freshwater, Atlantic Sturgeon use fast-flowing, rocky areas in rivers to spawn. They can be found in the Merrimack and Taunton Rivers.

### Threats

Dams, water pollution, historic over-fishing, and bycatch and the associated mortality rates are the major threats to this species. Two life history traits of the Atlantic Sturgeon make them particularly vulnerable to these threats: the late age at which they begin spawning, and their requirements for freshwater, estuarine, and coastal habitats to complete their life cycle.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2004. Atlantic Sturgeon (*Acipenser oxyrinchus*) Fact Sheet.

## Lake Chub (*Couesius plumbeus*, State Endangered)

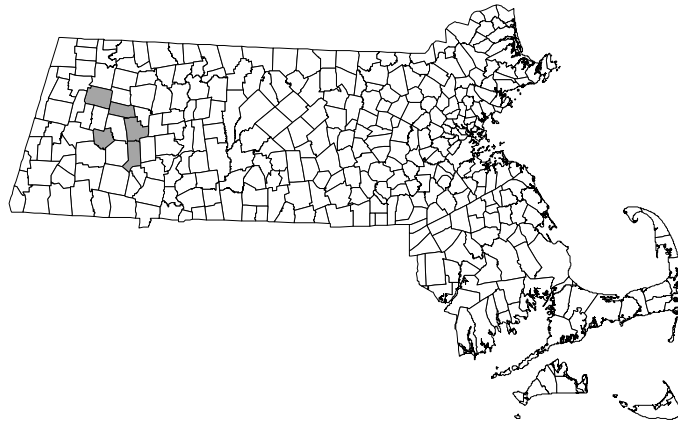
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Large & Mid-sized Rivers, Small Streams	State List

### Species Description

The Lake Chub is an elongate, round-bodied minnow with a small but well-developed thread-like barbel at the posterior end of the upper jaw. Most adult specimens measure about 4 inches long, but large ones can reach about 6 inches. The Lake Chub has a large eye and a bluntly rounded snout which slightly overhangs the mouth and is completely separated from the upper lip by a deep, continuous groove. The Lake Chub is dark greenish-gray or dark brown on the back, becoming silvery-gray on the sides and whitish on the belly.

### Distribution and Abundance

There have been seven occurrences of Lake Chub in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Lake Chub

### Habitat Description

The Lake Chub is restricted to clear, cold lakes and clear, cold, fast-flowing rivers. It has only been found in rivers in Massachusetts, and seems to prefer areas with gravel or cobble substrates and little or no vegetation.

### Threats

Habitat alterations such as increased turbidity, erosion and sedimentation, flow alterations, and pollution are major threats to the Lake Chub. This fish is a visual feeder, hence increased turbidity can decrease its feeding efficiency. Erosion, sedimentation, and flow alterations can degrade clean gravel spawning substrates that are required for healthy egg development.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Lake Chub (*Couesius plumbeus*) Fact Sheet.

## Eastern Silvery Minnow (*Hybognathus regius*, State Special Concern)

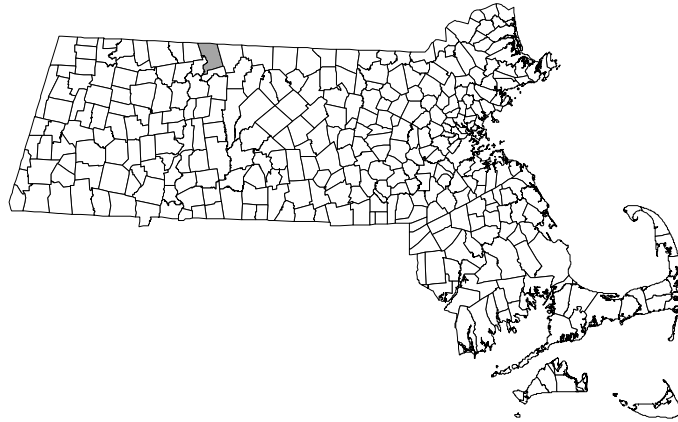
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Connecticut & Merrimack Mainstems; Large & Mid-sized Rivers	State List

### Species Description

The Eastern Silvery Minnow is a rather stout shiner that is generally around 3-5 inches long. It can best be distinguished by the following combination of characters: a small, slightly subterminal mouth; a lower jaw with a fleshy knob at the tip; a black peritoneum (lining of body cavity); a long coiled intestine; a complete lateral line; and 38-40 lateral line scales. The black peritoneum and the coiled intestine can sometimes be seen through the belly wall. This species is silvery in color and lacks distinctive color patterns.

### Distribution and Abundance

There has been one occurrence of the Eastern Silvery Minnow in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Eastern Silvery Minnow

### Habitat Description

The Eastern Silvery Minnow is found in shallow areas of large, slow-moving rivers over substrates of sand and mud or sand and gravel. It is often found in habitats such as oxbows and quiet pools. Currently, there is only one known population of Eastern Silvery Minnow in Massachusetts, in the Connecticut River.

### Threats

Habitat alterations that involve increased turbidity, erosion and sedimentation, flow alterations, and pollution are major threats to the Eastern Silvery Minnow. It uses aquatic vegetation as habitat, and increased turbidity and sedimentation can impact the growth of aquatic vegetation. In addition, sedimentation may cover organic matter that this species utilizes for food. Flow alterations can degrade backwater areas critical for spawning.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Eastern Silvery Minnow (*Hybognathus regius*) Fact Sheet.

## Bridle Shiner (*Notropis bifrenatus*, State Special Concern)

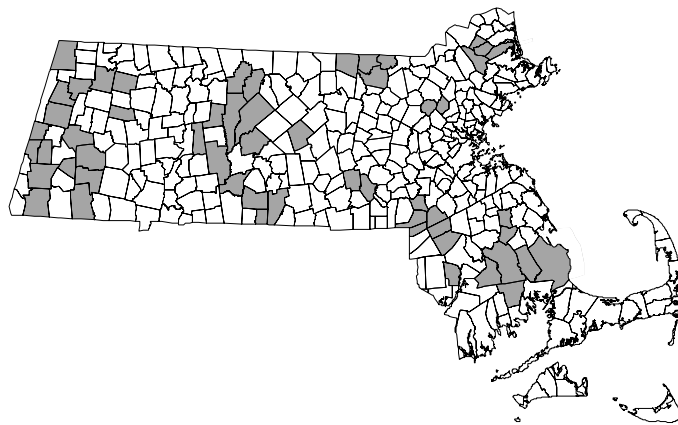
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	SNR	Lakes & Ponds	State List; NE F&W Agencies

### Species Description

The Bridle Shiner is a small, straw-colored minnow, usually less than 2 inches long, with a distinct dark lateral band that starts at the tip of the snout and ends in a spot at the base of the caudal fin. This minnow has a large eye and a somewhat pointed, slightly subterminal mouth. The scales on the sides of the body have distinct dark outlines. The peritoneum (lining of the body cavity) is silvery and lightly speckled.

### Distribution and Abundance

There have been 75 occurrences of the Bridle Shiner in Massachusetts documented since 1980 (NHESP database, accessed December, 2004). About half of these occurrences have been observed since 1990.



Massachusetts Towns with Recent Occurrences of Bridle Shiner

### Habitat Description

Bridle Shiners are found in clear water in slack areas of streams and rivers, and also in lakes and ponds. They are associated with moderate levels of submerged aquatic vegetation, with open areas where they can school. Bridle Shiners seem to prefer sites with high coverage of submerged aquatic vegetation within the bottom foot or so of the water column. In addition, sites with Bridle Shiner tend to have more aquatic vegetation with feather-like leaves, such as *Ceratophyllum*.

### Threats

Habitat alterations involving increased turbidity, flow alterations, draining of ponds, and the introduction of exotic invasive plant species are the major threats to this species. Bridle Shiners are visual feeders, hence any increase in turbidity will decrease their feeding efficiency. Bridle Shiners are also poor swimmers; thus, increases in flow rates can negatively impact their habitats. Since Bridle Shiners prefer clumps of aquatic vegetation interspersed with open areas, when exotic plants dominate a water body and form large, dense monocultures, Bridle Shiners do not thrive.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Bridle Shiner (*Notropis bifrenatus*) Fact Sheet.

## Northern Redbelly Dace (*Phoxinus eos*, State Endangered)

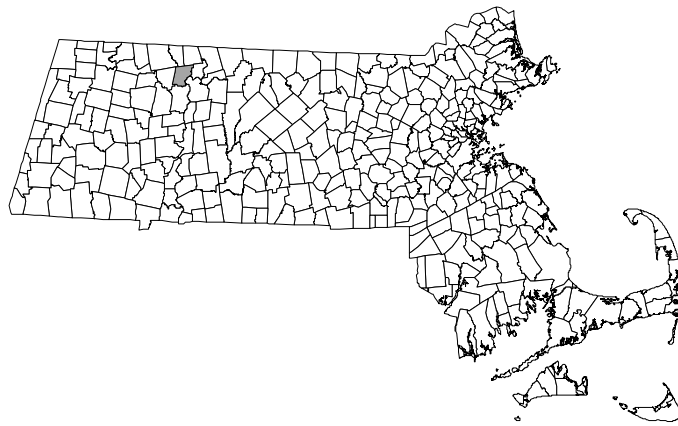
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Small Streams	State List

### Species Description

The Northern Redbelly Dace can be distinguished from all other Massachusetts minnows by the presence of two longitudinal dark or dusky stripes along each side, and small scales that are almost invisible to the naked eye. The upper stripe is often broken into small dots or patches behind the dorsal fin, but the lower stripe is always complete. Other characteristics, such as the long, coiled intestine and the black peritoneum (lining of body cavity) are also helpful in identifying this fish. The lateral line is incomplete; the mouth is small and oblique; and there are 70-90 lateral line scales. This species averages about 2 inches in length. The lower sides and belly are white, silver, or yellow. During breeding season, these areas become brilliant red on the males.

### Distribution and Abundance

There has been one occurrence of the Northern Redbelly Dace in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Northern Redbelly Dace

### Habitat Description

Northern Redbelly Dace are generally found in quiet, cool, boggy streams and lakes; in Massachusetts, however, they are found in clear streams and spring-fed seepage pools.

### Threats

It is unknown why the Northern Redbelly Dace has declined in Massachusetts. Possible threats include erosion and sedimentation, as well as flow alterations.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Northern Redbelly Dace (*Phoxinus eos*) Fact Sheet.

## Longnose Sucker (*Catostomus catostomus*, State Special Concern)

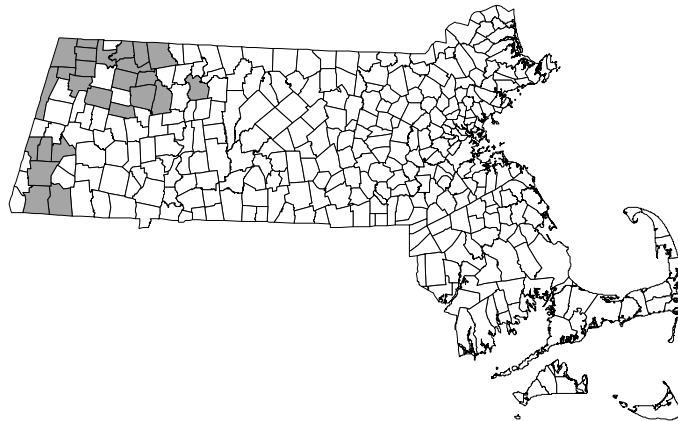
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Large & Mid-sized Rivers, Small Streams	State List

### Species Description

Longnose Suckers are torpedo-shaped fish with a snout that extends beyond the subterminal mouth. They can reach lengths of over 20 inches; however in New England they are generally smaller. They are silvery-gray to yellowish in color and sometimes have darker blotches or “saddlemarks” along their sides. During the breeding season they display a red lateral stripe and tubercles (pimple-like bumps) on their heads and fins.

### Distribution and Abundance

There have been 40 occurrences of Longnose Sucker in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Longnose Sucker

### Habitat Description

In Massachusetts, Longnose Suckers are found mainly in the cool upper sections of streams and rivers with rocky substrates. They are found only in the western part of the state, specifically in the Deerfield, Housatonic, Hoosic, and Westfield River watersheds. They are found in lakes in other parts of their range, and have been recorded as deep as 600 feet.

### Threats

Habitat alteration is a major threat, especially through erosion and sedimentation, flow alterations, and increased water temperatures. This species relies on clean, well oxygenated, gravel substrates for egg development; hence all these threats can decrease reproductive success severely. Dams also pose a threat, since they can cause sedimentation and prevent migration to preferred spawning habitats.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Longnose Sucker (*Catostomus catostomus*) Fact Sheet.

## Burbot (*Lota lota*, State Special Concern)

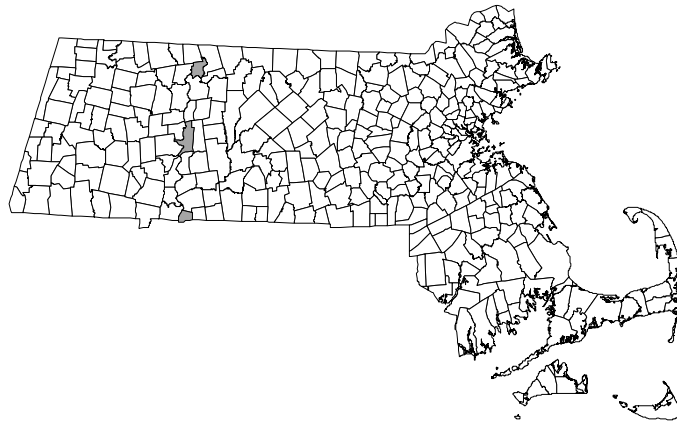
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Connecticut & Merrimack Mainstems; Large & Mid-sized Rivers	State List

### Species Description

The Burbot is a freshwater cod species with an elongate body and a single, noticeable, chin barbel. It has two dorsal fins. The second dorsal fin and the anal fin are elongate and end at the caudal peduncle. No other inland fish species in Massachusetts looks like this fish.

### Distribution and Abundance

There have been three occurrences of Burbot in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Burbot

### Habitat Description

Burbot are generally found in deep lakes and cool streams with sheltering elements, such as rock slabs and trees, in which they can hide. They can be found in the weedy areas of streams and large rivers and have been found to live among dense *Potamogeton* plants in New York. In lakes, they are found in the hypolimnion with other deep, cold-water fish such as trout. In Massachusetts, Burbot are rare. In recent years, only a few individuals have been collected in the Connecticut River watershed. Historically, these fish were also found in the Housatonic River watershed.

### Threats

As Burbot are coldwater fish, they are likely threatened by alterations, such as dams and power plant outflows, which may raise water temperatures or change flow characteristics.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Burbot (*Lota lota*) Fact Sheet.

## Threespine Stickleback (trimorphic freshwater population only, *Gasterosteus aculeatus*, State Threatened)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S4	Lakes & Ponds	State List

### Species Description

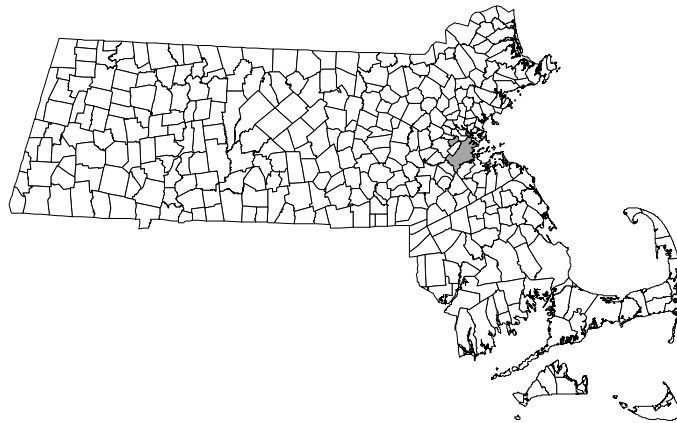
The freshwater Threespine Stickleback is a very small, armored fish with three serrated dorsal spines. Most specimens are generally 1-1.5 inches long, although marine populations are often larger, reaching up to 3 inches in length. The pelvic fin consists of one spine and one soft ray. This species is silvery yellow to light brown or green in color. During the breeding season, the breast and belly become bright red and the eyes turn a vivid light blue.

Threespine Sticklebacks can be common in both marine and freshwater environments. However, one population of Threespine Stickleback in Massachusetts is unusual, and it is only this population which is state Threatened. This population is the southernmost, completely freshwater population known and the only freshwater population in Massachusetts.

In addition, this population contains three distinct lateral-plate morphs (different forms), and is only the fourth record of low-plate individuals in eastern North America. These terms refer to the Threespine Stickleback's series of large, oblong, vertical bony plates, called lateral-plates, that armor the sides of the body. The three types of lateral-plates morphs (or forms) that this population of Threespine Stickleback have are: 1) completely plated, with plates along the entire side of the fish starting behind the gills; 2) medium plated, with plates only along the anterior half of the body; and 3) low plated, where there are only a couple of plates and the rest of the body is plate-free. Because this species has three different forms and different populations have some forms and not others, it is of special interest to evolutionary biologists.

### Distribution and Abundance

There has been one occurrence of the freshwater trimorphic Threespine Stickleback in Massachusetts documented since 1980 (NHESP database, accessed December, 2004). This is the southeastern-most population of freshwater-dwelling Threespine Sticklebacks in North America.



**Massachusetts Towns with Recent Occurrences of  
Threespine Stickleback, trimorphic freshwater population only**

### Habitat Description

The trimorphic freshwater population of Threespine Stickleback in Massachusetts inhabits a small, spring-fed pond and a second pond a short distance downstream.



**Threats**

The tiny area of aquatic habitat to which this entire stickleback population is confined makes it extremely vulnerable to a host of threats. Erosion, sewage, dumping of trash or toxic substances, introduction of other fish species, and alterations of water level could all threaten the continued survival of this population.

**Reference**

Massachusetts Natural Heritage & Endangered Species Program. 2003. Threespine Stickleback (*Gasterosteus aculeatus*) Fact Sheet.

## Blueback Herring (*Alosa aestivalis*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S4	Connecticut & Merrimack Mainstems; Large & Mid-sized Rivers; Marine & Estuarine Habitats	FS (fluvial specialist), MRE (Migratory Restoration Effort)

### Species Description

The Blueback Herring is a member of the herring family, similar in appearance to the Alewife, but the diameter of the Blueback's eye is less than or equal to the length of the snout, and the peritoneal lining of the body cavity is dusky-gray to black. The Blueback Herring's back and upper sides tend to be a bluish color. Adults are usually 10 to 12 inches in length. Young-of-the-year are generally less than 3 inches long while in freshwater. Blueback Herring are anadromous, spawning in swift-flowing sections of rivers and streams with gravel or rocky bottoms. The adults migrate back to salt water after spawning. The young form large schools and slowly work their way downstream to the sea. In freshwater, young Bluebacks eat copepods and some cladocerans. In marine waters, adults feed on a variety of marine invertebrates, including pelagic shrimp. Their first spawning migration occurs at 2 to 4 years of age, and the fish frequently live to eight years.

### Distribution and Abundance

Blueback Herring are common in Massachusetts and enter numerous coastal streams and the Connecticut and Merrimack rivers. Since they were often confused with Alewives, little information is available regarding their historical abundance. This species has been recommended for listing as a Species of Concern by the National Marine Fisheries Service.

### Habitat Description

Blueback Herring spawn in a wide range of lotic environments connected to the ocean.

### Threats

Like other river herrings, Blueback Herring populations have been reduced or eliminated in some areas by damming and pollution. The factors that have caused an apparent decline in this species are unknown, but may involve over-fishing. Further research and monitoring are required.

### Reference

This species description was adapted, with permission, from:

Karsten E. Hartel, David B. Halliwell, and Alan E. Launer. 2002. *Inland Fishes of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## **Alewife (*Alosa pseudoharengus*, no state or federal status)**

<b>Global Rarity Ranking</b>	<b>State Rarity Ranking</b>	<b>Habitats</b>	<b>Conservation Concern</b>
G5	SNR	Connecticut & Merrimack Mainstems; Large & Mid-sized Rivers; Lakes & Ponds; Marine & Estuarine Habitats	MRE (Migratory Restoration Effort)

### **Species Description**

The Alewife is a member of the herring family, very similar in appearance to the Blueback Herring, but the diameter of an Alewife's eye is greater than the length of the snout, and Alewives have a pale peritoneum with small spots that is never dusky to black. The back and upper sides tend to be greenish. Adults typically range from 10 to 12 inches in length. Young-of-the-year return to the sea before they are 4 inches long. Alewives are anadromous; they spend most of their adult life in coastal marine waters and return to freshwaters to spawn. During their spring spawning runs, schools of Alewives swim upstream, spawn numerous times over several days, and swim downstream, often passing other schools on their way up to the spawning grounds. Spawning occurs in sluggish backwaters of rivers and in ponds. Although the annual spawning migrations are physiologically stressful, most adults survive and are able to repeat the process in subsequent years. After hatching, juveniles form large schools and slowly work their way downstream to the sea. In freshwater, young Alewives feed primarily on zooplankton; after reaching marine waters, Alewives feed on zooplankton, small fishes, and crustaceans. They become sexually mature after three years and frequently live to nine years.

### **Distribution and Abundance**

Alewives are now found in most coastal rivers in Massachusetts. Colonial accounts mention their extreme abundance. Alewives are still common in some areas, but they have been eliminated or reduced in others. Entirely landlocked populations have been established through introductions in some inland waters, including Congamond, Singletary, and Webster lakes, and South Pond, Brookfield. This species has been recommended for listing as a Species of Concern by the National Marine Fisheries Service.

### **Habitat Description**

Alewives spawn in a wide range of lentic or slow-moving lotic aquatic environments. Anadromous populations require relatively easy access to the ponds in which they spawn.

### **Threats**

Like other river herrings, Alewife populations have been reduced or eliminated in some areas by damming, pollution, and development. Fishways, in place on many Alewife streams for hundreds of years, must continue to be maintained. Alewives are harvested commercially while at sea, and are also dipnetted during their spawning runs under town permits in Massachusetts; hence over-fishing must always remain a concern.

### **Reference**

This species description was adapted, with permission, from:

Karsten E. Hartel, David B. Halliwell, and Alan E. Launer. 2002. *Inland Fishes of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## American Shad (*Alosa sapidissima*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Connecticut & Merrimack Mainstems; Large & Mid-sized Rivers; Marine & Estuarine Habitats	MRE (Migratory Restoration Effort)

### Species Description

The American Shad is the largest member of the herring family found in Massachusetts waters, commonly reaching a length of 1.5 to 2 feet or more. It has more gill rakers (59-75) than all of the other herrings except the Gizzard Shad. The species is anadromous, ascending several coastal rivers to spawn, and often moves long distances up major rivers such as the Connecticut and Merrimack. After spawning, adult American Shad migrate back to marine environments. The young form large schools and feed in the river until they grow to about four inches, then migrate to the sea. Adult American Shad eat a wide variety of zooplankton, shrimp, and small fishes. In freshwater, the adults eat little and only occasionally feed on small prey. The young-of-the-year feed on small midwater copepods, ostracods, and insects. American Shad first spawn at the age of four or five years, and adults may live to 10 years of age.

### Distribution and Abundance

Historically in Massachusetts, the American Shad entered most coastal streams. Damming, dredging, pollution, and other alterations of Massachusetts waters caused large declines in the mid-1800s, when American Shad were eliminated from the Massachusetts portions of the Connecticut, Blackstone, and Charles rivers. Since the mid-1950s, with new or improved fishways and fishlifts, shad numbers have increased dramatically, especially in the Connecticut and Merrimack rivers.

### Habitat Description

American Shad spawn in a variety of lotic aquatic environments connected to the ocean.

### Threats

Dams, inadequate or poorly maintained fishways, and pollution are all threats to the continued health of this commercially and recreationally valuable fish.

### Reference

This species description was adapted, with permission, from:

Karsten E. Hartel, David B. Halliwell, and Alan E. Launer. 2002. *Inland Fishes of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## American Eel (*Anguilla rostrata*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Connecticut & Merrimack Mainstems; Large & Mid-sized Rivers; Lakes & Ponds; Marine & Estuarine Habitats	MRE (Migratory Restoration Effort)

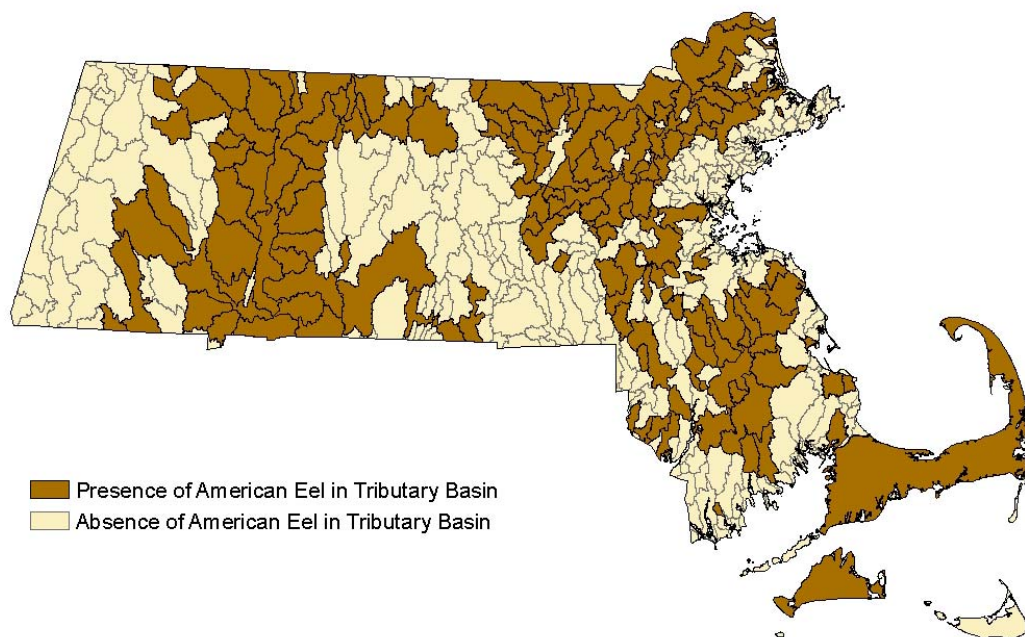
### Species Description

The American Eel can be identified by its elongate, snakelike body, single small gill openings, true jaws, and pectoral fins. The dorsal fin begins far behind the pectorals in the American Eel, which distinguishes it from the Conger Eel, *Conger oceanicus*, which is found in Massachusetts marine waters. Color varies in eels: at sea, larval eels are nearly transparent and colorless and, as they first assume adult shape, retain their transparency and are called "glass eels." Upon reaching freshwater, the larvae gradually develop pigment to become bronze-black above and silver-white below as adults. Female American Eels may grow to over 4 feet in length and weigh up to 16.5 pounds. A 52-inch female, weighing 7 pounds 8 ounces, and with a girth of 7.5 inches, was taken on hook and line from Santuit Pond, Mashpee. Males are much smaller than females, usually 12 to 14 inches; any American Eel over 16 inches is undoubtedly a female.

The American Eel is a catadromous fish that spawns in the open ocean south of Bermuda. Young eels migrate to the coast; some remain in the estuaries, but many thousands migrate hundreds of miles up rivers. They live in fresh or brackish water for 7 to 20 years, consuming invertebrates, fishes, and carrion. When mature, they stop feeding and migrate back to the sea to spawn and die.

### Distribution and Abundance

American Eels are common along the Massachusetts coast, as well as in ponds, rivers, and streams that are connected to the ocean. Though American Eels are still common, a range-wide study by Alex Haro (Conti Anadromous Fish Research Center) and colleagues shows declines in populations between 1984 and 1995. The USF&WS is currently conducting a status review of this species, for possible listing under the federal Endangered Species Act.



## **Habitat Description**

Eels appear to be habitat generalists, surviving in a wide range of lentic and lotic environments.

## **Threats**

Water pollution, dams which hinder migration, and possibly over-fishing (particularly of the youngest “glass eels”) are the major threats to this species. A threat which has recently been identified are the changes in ocean circulation patterns, affecting the distribution of larval eels. It is not clear why eel stocks appear to have fallen dramatically in the past few decades, so further monitoring and research will be required to insure that populations can be sustained.

## **Reference**

This species description was adapted, with permission, from:

Karsten E. Hartel, David B. Halliwell, and Alan E. Launer. 2002. *Inland Fishes of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## White Sucker (*Catostomus commersoni*, no state or federal status)

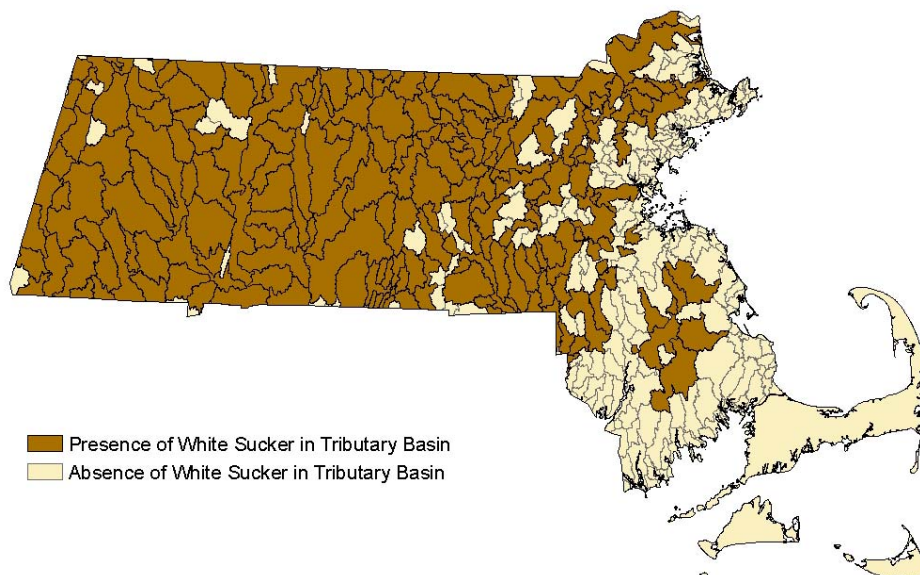
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Connecticut & Merrimack Mainstems; Large & Mid-sized Rivers; Lakes & Ponds	FD (fluvial dependent), TFC (Core Target Fish Community Species)

### Species Description

The White Sucker is similar in appearance to the Longnose Sucker except that its snout is rounded and barely projects beyond the upper lip when viewed from below. White Suckers have fewer than 75 scales in a lateral series and fewer than 11 scales above the lateral line. Three or more irregular lateral blotches are usually present in juveniles and some adults. Large specimens may reach lengths of 28 to 30 inches, but most individuals are less than 2 feet long. Spawning takes place in mid-April to May in Massachusetts, when adults move upstream into tributaries or into shoal areas if tributaries are not available. Young-of-the-year grow quickly and may reach 4.5 inches in length by the end of their first summer. Adults live up to 10 years. Food is mainly benthic invertebrates and fish eggs, but larval midges make up a portion of the diet.

### Distribution and Abundance

In Massachusetts, White Suckers are found in virtually every drainage with the exception of Martha's Vineyard and Nantucket and several of the smaller mainland coastal streams. This species is abundant in many locations.



### Habitat Description

White Suckers live in a wide variety of habitats in Massachusetts. They are most often found in ponds, lakes, and rivers, especially if there are tributaries with gravel runs in which to spawn.

### Threats

Water pollution, siltation and impassible constructions such as dams or poor culvert designs are potential threats to this species.

### Reference

This species description was adapted, with permission, from:

Karsten E. Hartel, David B. Halliwell, and Alan E. Launer. 2002. *Inland Fishes of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Slimy Sculpin (*Cottus cognatus*, no state or federal status)

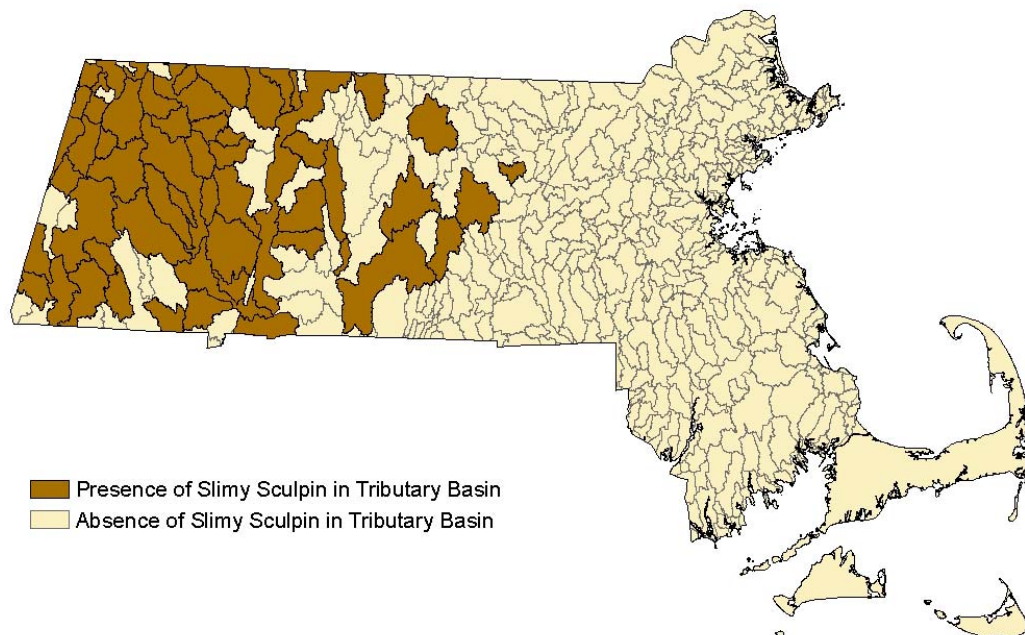
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Small Streams	FS (fluvial specialist), PI (pollution intolerant), Coldwater Complex of Species, Disturbance Intolerant

### Species Description

The Slimy Sculpin has a broad head, tapering body, large fanlike pectoral fins, a hooked preopercular spine, no scales, pelvic fins positioned under the anterior base of the pectoral fins, and soft, flexible fin spines. This species is mottled brown to gray dorsally with saddle-shaped blotches that sometimes extend onto the upper sides. Breeding males are darker, almost black above, with a bright orange border on their first dorsal fin. This is the only sculpin found in Massachusetts freshwaters. (Another small sculpin, the Grubby, *Myoxocephalus aeneus*, is common in local marine waters, but never enters freshwater habitats.) The Slimy Sculpin is a relatively small fish; most adults are about 3 inches long. Exceptional specimens may exceed 4.5 inches. Slimy Sculpin feed primarily on bottom-dwelling invertebrates, particularly aquatic insect larvae and nymphs. Small crustaceans, fishes, and aquatic vegetation are consumed in lesser amounts.

### Distribution and Abundance

In Massachusetts, Slimy Sculpin are common and widely distributed in suitable habitats west of the Connecticut River. East of the Connecticut River, there are small, geographically isolated populations in the Millers, Chicopee, and Nashua river basins. In 1861, specimens were taken from the lower Merrimack near Lawrence, but this population has apparently been extirpated.



### Habitat Description

In Massachusetts, Slimy Sculpin are known only from high-gradient, rocky, clear, cold streams. In other parts of their range, they also inhabit cold-water lakes and low-gradient, spring-fed streams. In streams, Slimy Sculpin inhabit riffles and tend to stay close to the bottom, generally hidden in the stony substrate.



**Threats**

The continued presence of Slimy Sculpin in eastern Massachusetts depends on the protection of habitat adjoining hill-streams. Changes in water quality, probably due to acid rain, have impacted a number of Slimy Sculpin populations, and activities which increase turbidity or temperature are likely to impact this species.

**Reference**

This species description was adapted, with permission, from:

Karsten E. Hartel, David B. Halliwell, and Alan E. Launer. 2002. *Inland Fishes of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Banded Sunfish (*Enneacanthus obesus*, no state or federal status)

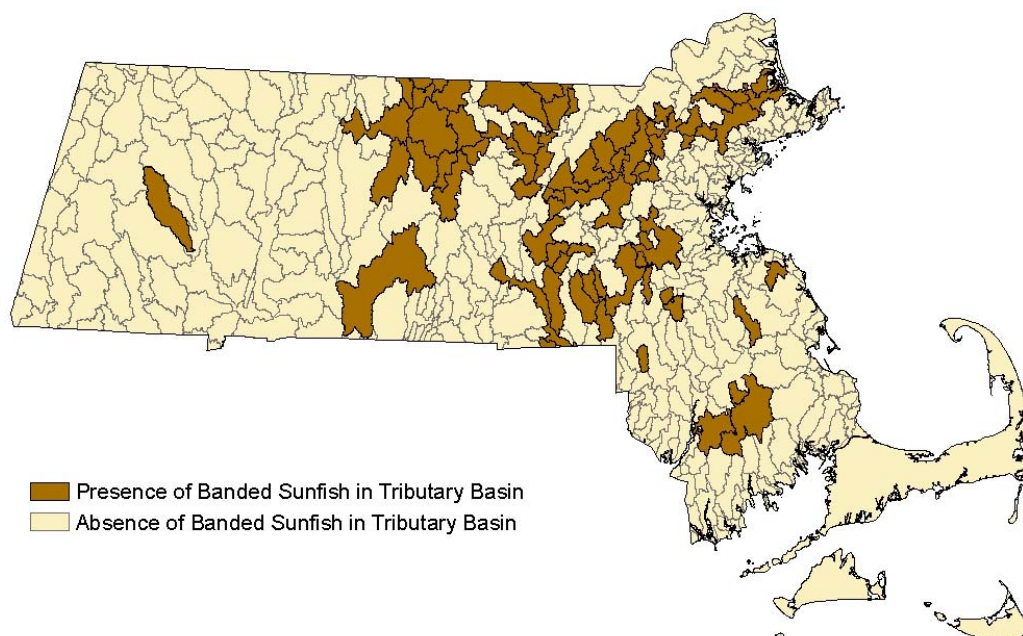
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S4	Large & Mid-sized Rivers; Lakes & Ponds	NE F&W Agencies, Limited Distribution

### Species Description

The Banded Sunfish is a small, stout-bodied fish, and the only local sunfish with a rounded tail fin and short-round pectoral fins. It is olive-green to brown with numerous small bronze, silver-green, and light blue spots on the body, and 5 to 8 dark vertical bars. This species rarely exceed 2 to 3 inches in length, although specimens over 4 inches have been recorded from Massachusetts. Banded Sunfish usually live three to four years, although five-year-old specimens have been recorded. They feed on a wide variety of small aquatic invertebrates, including cladocerans, copepods, dipterans, and amphipods. The relative size and seasonal abundance of prey greatly influence their diet.

### Distribution and Abundance

This species is widespread in most of eastern Massachusetts, but known only from a few sites on Cape Cod and two locations on Martha's Vineyard. In the inland portion of the state, Banded Sunfish have been seen only in the upper Chicopee Drainage (Burnshirt and Ware rivers), Nashua River, and the upper Millers River drainages. These Chicopee and Millers populations are most likely the result of stream capture with the Merrimack Basin. This species is still common in the proper habitat but has declined with urban sprawl when small, swampy wetlands were drained.



### Habitat Description

Banded Sunfish live in quiet backwaters, swamps, and ponds. They are frequently associated with heavy aquatic vegetation and have been observed to thrive in naturally acidic waters.

### Threats

It appears that the major threat to this species is loss of its shallow wetland habitats to development and/or pollution.

### Reference

This species description was adapted, with permission, from: Karsten E. Hartel, David B. Halliwell, and Alan E. Launer. 2002. *Inland Fishes of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Creek Chubsucker (*Erimyzon oblongus*, no state or federal status)

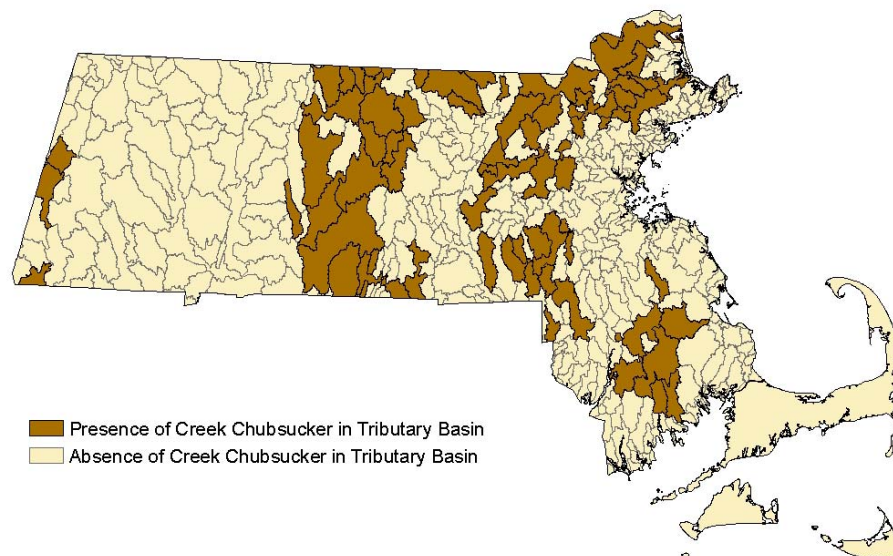
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Large & Mid-sized Rivers	FS (fluvial specialist), TFC (Core Target Fish Community Species), PI (pollution intolerant), Disturbance Intolerant

### Species Description

The Creek Chubsucker looks superficially like a minnow, but has pleated and fleshy lips, a posteriorly placed anal fin, and a higher number of dorsal fin rays. The mouth is almost terminal, the scales are large, and lateral-line pores are lacking. Young have a dark brown mid-lateral stripe from the snout to the base of the caudal fin, and a second, less-defined stripe between it and the dorsal midline on a golden-bronze to yellow-brown background. Adults lose these colors although occasional diffuse vertical blotches may be present along the sides of the body. Most specimens are generally under 9 inches in length, but are capable of attaining twice that length. Creek Chubsuckers feed on plant material and a variety of aquatic and terrestrial invertebrates. The species spawns in streams, but spends most of the year in downstream habitats. Female Creek Chubsuckers can live at least seven years.

### Distribution and Abundance

In Massachusetts, this species is relatively more common east of Quabbin Reservoir, but is not known from Cape Cod and the Islands. Surveys between 1970 and 1991 have failed to find this species at a number of localities in Massachusetts where they were found prior to 1969. The areas where they were not collected are scattered throughout their local range, and their absence cannot be attributed to any particular environmental factors.



### Habitat Description

This species is typically found in creeks, streams, and lakes with moderate quantities of aquatic vegetation, but is also found in the clear waters of lakes and reservoirs.

### Threats

This species is known to be sensitive to pollutants, especially silt.

### Reference

This species description was adapted, with permission, from: Karsten E. Hartel, David B. Halliwell, and Alan E. Launer. 2002. *Inland Fishes of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Swamp Darter (*Etheostoma fusiforme*, no state or federal status)

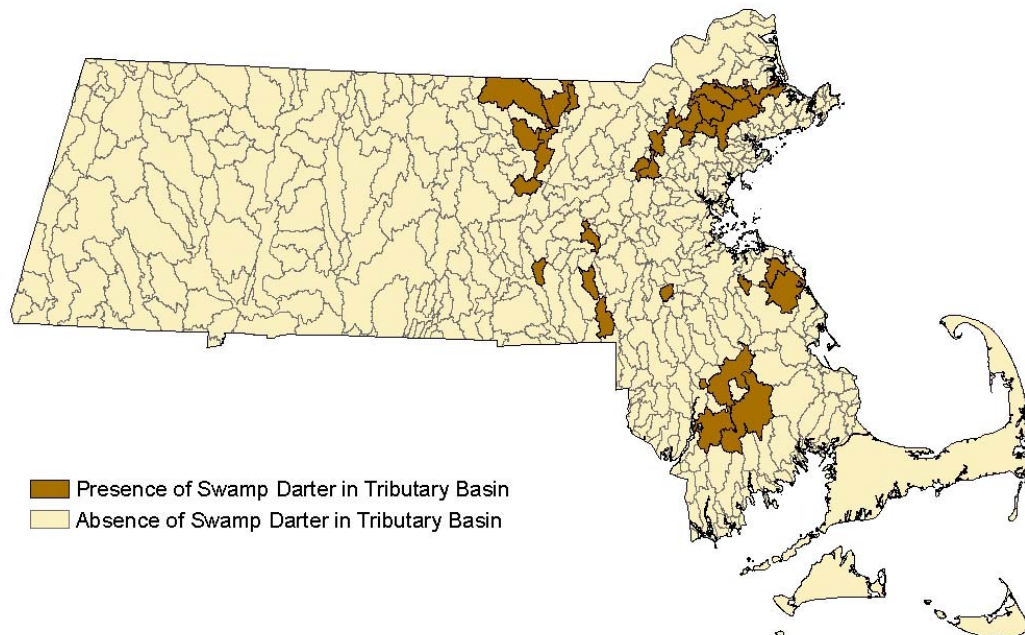
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S4	Large & Mid-sized Rivers; Lakes & Ponds	PI (pollution intolerant)

### Species Description

The Swamp Darter has an incomplete lateral line that curves upward within three scales of the first dorsal fin and two anal spines. The body is brownish tan with about 10 dark-brown blotches that often merge into a continuous band along the midside, and a small spot at the base of the tail. Overall coloration varies; fishes from weedy and tannic waters are quite dark, while those from sandy-bottomed clear ponds are somewhat lighter in color. Adults range from 1 to 2 inches. Swamp Darters often rest on aquatic vegetation and dart out to capture small aquatic organisms. Copepods seem to be their most common prey.

### Distribution and Abundance

In Massachusetts, Swamp Darters are found in all major drainages in the eastern part of the state, on Cape Cod, Nantucket, and Martha's Vineyard. Swamp Darters are still common in many areas of eastern Massachusetts. However, their overall distribution has been reduced due to development of the large eastern cities and towns.



### Habitat Description

Swamp Darters typically inhabit still or slow-flowing water where vegetation is abundant over mud and detritus bottoms. On Cape Cod and the Islands, however, they are found in clear-water ponds with only moderate vegetation.

### Threats

Pollution or other alterations to its habitats appear to be the major potential threats to this species.

### Reference

This species description was adapted, with permission, from:

Karsten E. Hartel, David B. Halliwell, and Alan E. Launer. 2002. *Inland Fishes of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## **Tessellated Darter (*Etheostoma olmstedii*, no state or federal status)**

<b>Global Rarity Ranking</b>	<b>State Rarity Ranking</b>	<b>Habitats</b>	<b>Conservation Concern</b>
G5	S5	Large & Mid-sized Rivers	FS (fluvial specialist), TFC (Core Target Fish Community Species), PI (pollution intolerant), Disturbance Intolerant

### **Species Description**

The Tessellated Darter has a continuous lateral line along the midbody that does not arch upward, and also has a single anal spine. Nonbreeding specimens are sandy-tan with several dark saddle-like marks and 9 to 10 dusky, lateral spots that often suggest the letters x, y, or z. Males usually have a dark blotch on the membrane between the first and second dorsal spines, and when breeding, become quite black and develop swollen white tips on the pelvic fins. Adults are usually 2 to 3 inches long, occasionally reaching 4 inches. This fish often sits motionless, propped up on its pelvic fins, on the bottom or on rocks, then makes abrupt, quick darts when feeding or disturbed. The species is short-lived, and most individuals die after their third summer, although a few survive into their fourth winter. Tessellated Darters feed mainly on the larvae of midges and other flies; however, they may switch to other food, such as caddisflies, later in the season.

### **Distribution and Abundance**

In Massachusetts, this darter is common in most of the Connecticut and Blackstone river basins, in the southeastern parts of the state, and on Martha's Vineyard. It is rare in the northeast drainages, where only a few specimens have been found in the Merrimack River Drainage. This darter is absent from the Hoosic, upper Deerfield, Charles, and Nantucket drainages.

### **Habitat Description**

The Tessellated Darter prefers moving water and, unlike the Swamp Darter, is seldom found in lakes or ponds. It frequents areas with rubble, sand, or mud bottoms that usually have some vegetation. Underwater objects, usually rocks or logs, are required for spawning.

### **Threats**

Pollution or other alterations to its habitats appear to be the major threats to this species.

### **Reference**

This species description was adapted, with permission, from:

Karsten E. Hartel, David B. Halliwell, and Alan E. Launer. 2002. *Inland Fishes of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Common Shiner (*Luxilus comutus*, no state or federal status)

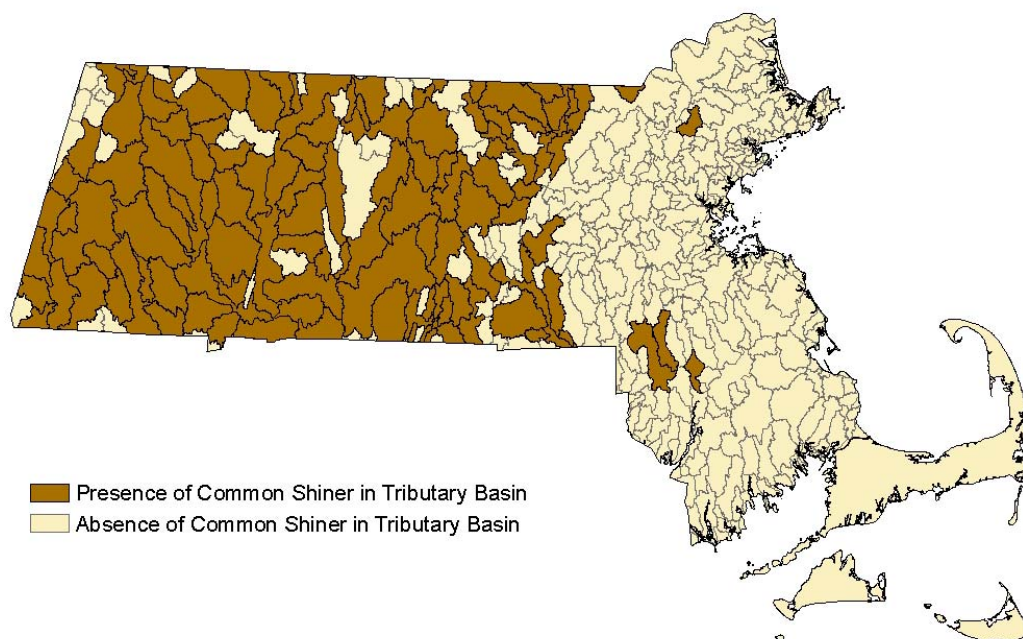
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Connecticut & Merrimack Mainstems; Large & Mid-sized Rivers; Lakes & Ponds	FD (fluvial dependent), TFC (Core Target Fish Community Species)

### Species Description

The Common Shiner is a relatively deep-bodied minnow with a combination of 9 anal rays (rarely 8 or 10); deeper-than-wide anterior lateral scales; and more than five scales above the lateral line. It has distinctive horizontal stripes that appear in three bands: a pale middorsal band, a darker stripe below it, and a second pale stripe below that. In breeding males the stripes become golden and the body bronze; dark crescent-shaped marks appear on the body; the head darkens to blue-gray; and the fins darken with a pink to red distal edge. This species often reaches 5 to 6 inches in length; some Massachusetts specimens reach 7 inches. The Common Shiner feeds mainly at the surface or in midwater, but it is an opportunistic feeder. Aquatic insects, including both adults and larvae, are the primary food source, but small fishes and some plant material are also eaten occasionally.

### Distribution and Abundance

In Massachusetts, Common Shiners are most often found in large rivers to small streams with relatively clean water. In Massachusetts, this minnow is most common from the Connecticut Drainage west, where it is found in all of the major Connecticut River tributaries and in the Hoosic and Housatonic rivers. In addition, there are scattered records from the Nashua, Merrimack, French, Blackstone, Taunton, and Charles river drainages. It is absent from all coastal streams, Cape Cod, and the Islands. The species may be declining.



### Habitat Description

The Common Shiner is common in many lotic and lentic environments in Massachusetts, but spawning sites are usually over gravel beds in running water.

### Threats

It appears that the Common Shiner has declined in relative occurrence in the central and eastern portions of the state during the past century. The causes are unknown.

**Reference**

This species description was adapted, with permission, from: Karsten E. Hartel, David B. Halliwell, and Alan E. Launer. 2002. *Inland Fishes of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.



## Sea Lamprey (*Petromyzon marinus*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S4	Connecticut & Merrimack Mainstems; Large & Mid-sized Rivers; Marine & Estuarine Habitats	MRE (Migratory Restoration Effort), Rangelwide Habitat Impact with Localized High Impact

### Species Description

The Sea Lamprey is a primitive, eel-like fish that lacks jaws, scales, paired fins, and bones. It has a cartilaginous skeleton, one nostril between the eyes, and seven pairs of pore-like gill openings. Adults are usually greater than 24 inches in total length. Sea Lamprey are anadromous. Adults are parasitic, attaching themselves to a variety of oceanic species and feeding on their blood and body fluids. After two years at sea, the adults enter fresh water in the spring and spawn in July. After spawning the adults die. Juveniles, eyeless larva known as ammocoetes, burrow into the stream bottom and live as filter feeders for four to five years. Eventually ammocoetes transform into young adults that migrate to the ocean.

### Distribution and Abundance

Sea Lamprey are common in Massachusetts and enter numerous coastal streams and the Connecticut and Merrimack rivers. Records of Sea Lamprey passage at the Holyoke dam on the Connecticut River demonstrate that current abundance is roughly 50% of the historic numbers.

### Habitat Description

Sea Lamprey spawn in small- to medium-sized streams with gravel or rocky substrates, which are connected to the ocean.

### Threats

Like other anadromous fish, Sea Lamprey populations have been reduced or eliminated in some areas by damming and pollution. The factors which have caused an apparent decline in this species are most likely due to loss of spawning and rearing habitat, because of dams.

### Reference

This species description was adapted, with permission, from: Karsten E. Hartel, David B. Halliwell, and Alan E. Launer. 2002. *Inland Fishes of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.



## Blacknose Dace (*Rhinichthys atratulus*, no state or federal status)

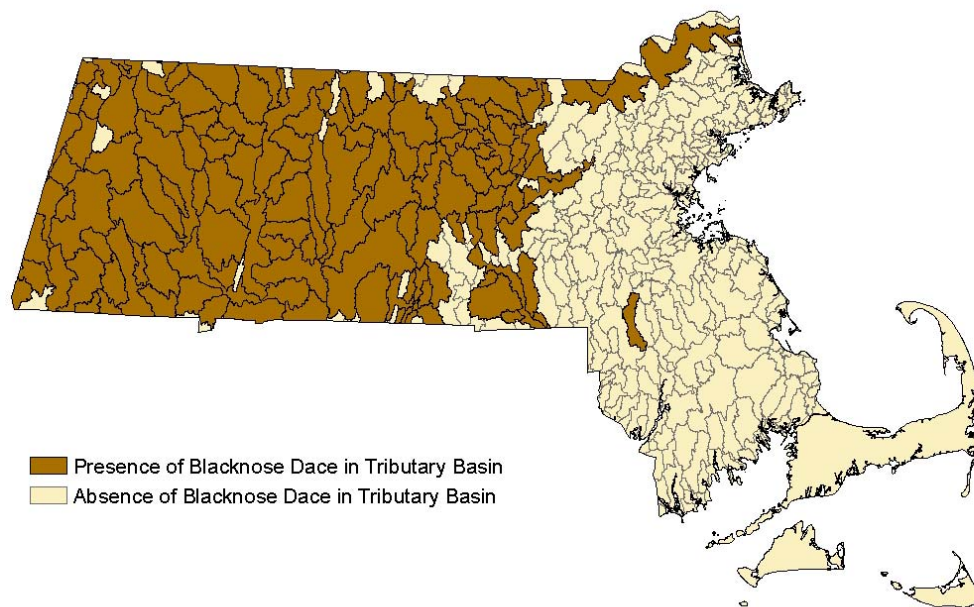
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Small Streams, Large & Mid-sized Rivers	FS (fluvial specialist), TFC (Core Target Fish Community Species)

### Species Description

The Blacknose Dace has a barbel at each corner of the mouth, and a band of tissue (frenum) connects the upper lip to the snout. It is most similar to the Longnose Dace, but can be distinguished by the relative length of the snout, the eye size, the position of the eye in relation to the mouth, and the pigment stripe on the snout. A dark stripe running around the snout, through the eyes, and along most of the midbody separates the olive-brown back and a silvery-white belly. In breeding males, the pectoral, pelvic, and anal fins are orange. Blacknose Dace usually reach a length of only 3 inches, but may grow to 4 inches. They feed on a wide variety of aquatic invertebrates and terrestrial insects. Aquatic fly larvae are a favored prey. Blacknose Dace may live for three to possibly four years.

### Distribution and Abundance

The Blacknose Dace can be found in almost every hill stream in central and western Massachusetts and is by far the most common stream minnow, occurring from the Hudson to the Blackstone drainages and north through western portions of the Merrimack River Drainage. In the eastern portion of the state, Blacknose Dace are now found only in five streams tributary to the Merrimack River, and in four streams in the Concord-Assabet River Drainage. The species is notably absent from all other Massachusetts coastal drainages.



### Habitat Description

This species appears to do best in small lotic habitats.

### Threats

Water pollution and sediment deposition in spawning areas are possible threats to this species.

### Reference

This species description was adapted, with permission, from:  
Karsten E. Hartel, David B. Halliwell, and Alan E. Launer. 2002. *Inland Fishes of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Longnose Dace (*Rhinichthys cataractae*, no state or federal status)

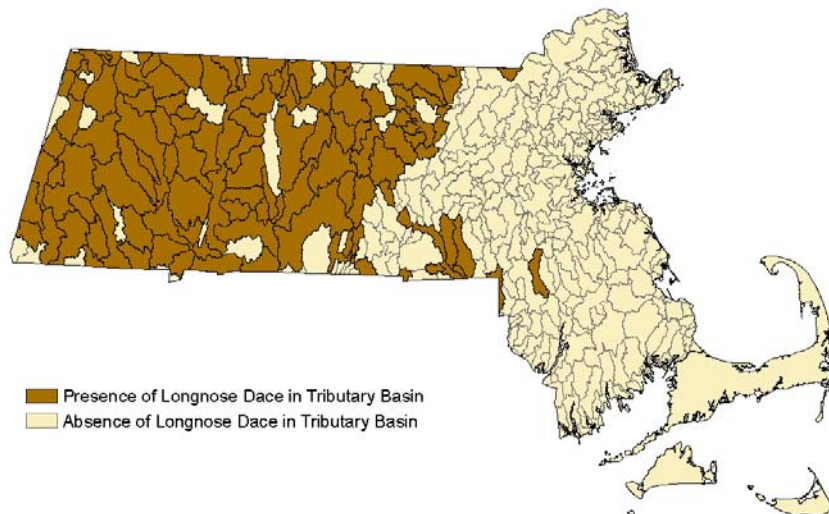
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Small Streams, Large & Mid-sized Rivers	FS (fluvial specialist), TFC (Core Target Fish Community Species)

### Species Description

The Longnose Dace has a barbel at each corner of the mouth, and a band of tissue (frenum) connects the upper lip to the snout. It is similar to the Blacknose Dace, but has a subterminal mouth and usually lacks the dark band around the snout and along the body. It can be positively identified by the length of the snout, eye size, and the position of the eye in relation to the mouth. The stripes on the snout and the midlateral area are diffuse and are not prominent. Breeding males are orange-red at the base of the pectoral and pelvic fins, on the cheek, throat, and lips; an orange wash is sometimes present on the midlateral area and on the dorsal and anal fins. Longnose Dace lack the papillae found on the lips of suckers. Adults are normally about 3 inches long, but some specimens get close to 6 inches. They can live to five years, and spend most of their adult lives on or near the bottom in turbulent water or adjacent pools. Their diet consists primarily of immature aquatic insects that cling to rocks and boulders. The species is one of the chief predators of larval blackflies and midges, but they will also prey on other small aquatic invertebrates.

### Distribution and Abundance

In western Massachusetts, the species is common in clear streams with riffles, boulders, and gravel, but has also been sampled in large numbers from lower-gradient, mainstem rivers. The species is absent from almost all of the eastern part of the state except in upland tributaries to the Nashua River. It is sometimes abundant, appearing in densities of almost one fish per square foot.



### Habitat Description

Longnose Dace are usually associated with steep-gradient, cold-water streams, but they are sometimes found in lower-gradient, warm-water rivers.

### Threats

Water pollution and dams are possible threats to this species.

### Reference

This species description was adapted, with permission, from:  
Karsten E. Hartel, David B. Halliwell, and Alan E. Launer. 2002. *Inland Fishes of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Atlantic Salmon (*Salmo salar*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Connecticut & Merrimack Mainstems; Large & Mid-sized Rivers; Small Streams; Marine & Estuarine Habitats	FS (fluvial specialist), MRE (Migratory Restoration Effort), PI (pollution intolerant)

### Species Description

The Atlantic Salmon and the related Brown Trout are similar in appearance, but adult Atlantic Salmon have small X-shaped spots on the body, a smaller mouth, a more deeply-forked tail, and longer pectoral fins than the Brown Trout. They can be distinguished from the various Pacific salmon by the lack of black spots on the caudal fin. Juvenile Atlantic Salmon (parr) have 8 to 11 narrow parr marks with a single red spot between each pair of parr marks. The average size of anadromous and landlocked Atlantic Salmon differs, with landlocked populations rarely exceeding 20 inches in length while anadromous forms commonly reach 30 inches. Anadromous Atlantic Salmon spawn in freshwater streams and then return to the sea. Young salmon remain in freshwater for two to three years, descending to the sea as "smolts" when they reach 5 to 9 inches. At sea, they live for one or two more years before returning to their natal streams to spawn. Unlike most Pacific salmon, which die after spawning, many post-spawning Atlantic Salmon survive and return to the sea. Food habits vary with life stages. At sea, salmon eat a variety of marine organisms, including crustaceans and smaller fishes. Young Atlantic Salmon feed primarily on aquatic and terrestrial insects while they are in freshwater. Landlocked Atlantic Salmon in large Massachusetts reservoirs feed principally on introduced Rainbow Smelt, young White Perch, and midges and ants.

### Distribution and Abundance

In Massachusetts, native anadromous Atlantic Salmon were historically known from the Connecticut and Merrimack rivers. Populations may also have been present in other suitable rivers before they were also overfished and/or dammed. For many years, ongoing attempts to restore Atlantic Salmon to Massachusetts rivers have had limited success due to a combination of many factors, including poorly designed fishways, inferior genetic stock, turbine mortality, and poor survival rates at sea. Landlocked Atlantic Salmon have been introduced into the Quabbin, Wachusett, and Littleville reservoirs. These landlocked forms, originating from lakes in Maine and New Hampshire, are genetically similar to anadromous Atlantic Salmon but differ primarily in their nonmigratory habits and their ability to live in deep lake environments.

### Habitat Description

This species requires cold, clear, clean, gravel-bottomed lotic environments in which to spawn.

### Threats

The primary threats to this species include dams which impede or prevent up- and downstream movements of adults and young; water pollution; and siltation of spawning habitat.

### Reference

This species description was adapted, with permission, from:

Karsten E. Hartel, David B. Halliwell, and Alan E. Launer. 2002. *Inland Fishes of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Brook Trout (*Salvelinus fontinalis*, no state or federal status)

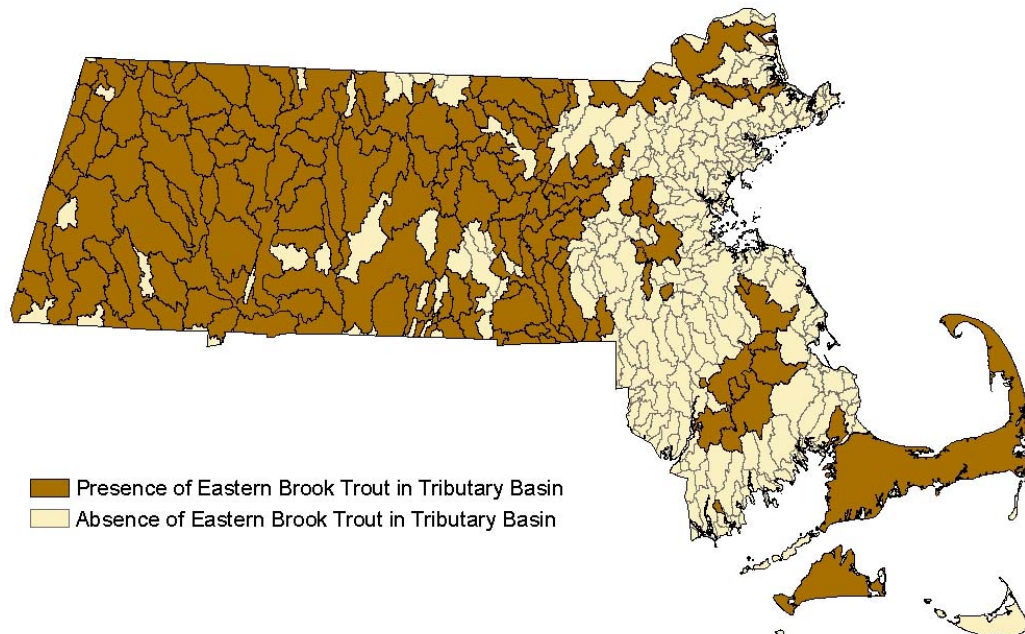
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Large & Mid-sized Rivers; Small Streams	FS (fluvial specialist), PI (pollution intolerant), E. Brook Trout Joint Venture, Coldwater Complex of Species

### Species Description

The Brook Trout (technically a char) has heavy dorsal vermiculations (worm-like markings) and a dark stripe behind the white leading edges of the pelvic and anal fins. In addition, they have a squarish or shallowly forked tail and red spots, often with blue halos, along the sides. Colors intensify during spawning and the lower flanks and belly of males become deep magenta. Adult Brook Trout in Massachusetts streams typically reach 6 to 8 inches in length, but 10 to 12 inch specimens are possible in unexploited populations. One- or two-year-old fish ranging from 3 to 6 inches are most numerous in stream populations, but those living in cold-water ponds and lakes and the coastal salter populations (a sea-run form) grow considerably larger and faster. Brook Trout spawn in both lakes and streams, although lake-spawning populations are rare in Massachusetts. The life span of Brook Trout in Massachusetts streams seldom exceeds three growing seasons. Stream Brook Trout are insectivorous throughout their lives. Pond-dwelling and salter Brook Trout populations tend to consume fish in addition to invertebrates.

### Distribution and Abundance

Reproducing Brook Trout are found all across Massachusetts. Due to widespread introductions, native populations are difficult to distinguish from stocked populations. Brook Trout are most common in western and central Massachusetts and occur only sporadically in the east. The eastern populations have declined, and today only a few geographically isolated populations remain. Likewise, salter Brook Trout that were historically found in one or two tributaries to Massachusetts Bay have been extirpated. Salters, though reduced in numbers, are still known from a few tributaries to Nantucket Sound, as well as Buzzards and Narragansett bays.



### Habitat Description

In Massachusetts, Brook Trout inhabit flowing, highly oxygenated, cold-water streams. They tolerate a variety of habitats, from high-gradient mountain streams to low-gradient meadow brooks generally kept cool by groundwater or springs. The sea-run form, or salter, has a life cycle similar to that of the Atlantic Salmon, with adults spending part of their lives in salt water. Brook Trout have more rigid temperature requirements than do Brown Trout,

Rainbow Trout, or Atlantic Salmon. They generally do not tolerate water temperatures exceeding 68°F for extended periods of time. Studies in Massachusetts indicate that the optimum range for maximum activity and feeding is 55°-65°F. Stream populations spawn over gravel riffles composed of coarse sand or stones up to 4 inches in diameter. The remnant Brook Trout populations in eastern Massachusetts are indicators of the location of relatively undisturbed environments. Their continued presence serves as a barometer for measuring the condition of the environment for the trout and other organisms that require cold clean water.

### **Threats**

Any activities which decrease water quality, increase temperature or cause siltation of spawning habitat are detrimental to this sensitive species. Some populations rely on springs as refuge areas during the warmest periods of the year; if the flow of such springs is altered or reduced, it may result in the loss of the population.

### **Reference**

This species description was adapted, with permission, from:

Karsten E. Hartel, David B. Halliwell, and Alan E. Launer. 2002. *Inland Fishes of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Creek Chub (*Semotilus atromaculatus*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S4	Large & Mid-sized Rivers; Small Streams	FS (fluvial specialist), TFC (Core Target Fish Community Species)

### Species Description

The Creek Chub is similar to the Fallfish, which also has a leaflike fleshy barbel in the groove behind the upper jaw. Care must be taken in looking for the barbels; they may rarely be absent from either or both sides. The species displays a distinctive, small spot near the anterior base of the dorsal fin and more than 50 lateral line scales. Young Creek Chub have a lateral band from the snout to the caudal base that often ends in a basi-caudal spot. Breeding males darken dorsally and have a yellow to rosy wash along the body. Adults from Massachusetts are usually 4 to 5 inches in length, but have the potential to reach twice that length. They live for four years or more. The Creek Chub is opportunistic, feeding at all depths in the stream, most intensively in the evening. The diet includes a wide range of aquatic insect larvae and pupae, fishes, and mollusks. Burrowing bottom organisms are taken to a lesser extent because the Creek Chub seems to rely on sight to find food.

### Distribution and Abundance

In Massachusetts, the Creek Chub is found in most major river drainages west of the Connecticut River. East of the Connecticut River, the species is much less common.

### Habitat Description

In Massachusetts, this species is most often found in small streams with gravel bottoms.

### Threats

Water pollution and activities which increase turbidity are potential threats to this species.

### Reference

This species description was adapted, with permission, from:

Karsten E. Hartel, David B. Halliwell, and Alan E. Launer. 2002. *Inland Fishes of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.



## Fallfish (*Semotilus corporalis*, no state or federal status)

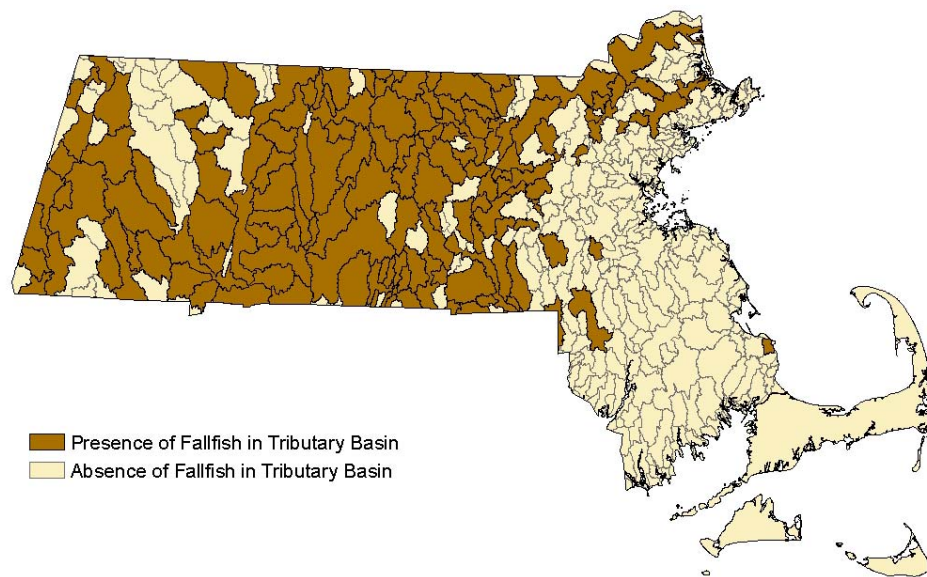
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Connecticut & Merrimack Mainstems; Large & Mid-sized Rivers; Small Streams	FS (fluvial specialist), TFC (Core Target Fish Community Species)

### Species Description

The Fallfish is similar in appearance to the Creek Chub, which also has a leaflike, fleshy barbel in the groove behind the upper jaw, but adult Fallfish have diagnostic dark marks at the base of each scale and fewer than 50 lateral-line scales. Fallfish are silvery with a dark olive-brown to almost black dorsal area. Young Fallfish have a pronounced lateral band. This species is Massachusetts' largest native minnow. Adults just under a foot long are common. The largest recorded Massachusetts specimen measured 19 inches. Fallfish are omnivorous, eating plankton until they are about 1.5 inches long, and gradually switching to larger foods such as algae, insects, crayfish, and fishes. It takes five years for a Fallfish to reach about 8 inches, and almost 10 years to reach maximum size.

### Distribution and Abundance

In Massachusetts, Fallfish are common in the Connecticut River Basin but rare in the eastern part of the state, where some populations have apparently disappeared in the last century.



### Habitat Description

In Massachusetts, Fallfish are most often found in rivers and streams with rock and gravel substrates, but some populations occur in larger ponds and reservoirs. Adults migrate to areas with rock and gravel substrate in the spring.

### Threats

Water pollution and activities which increase turbidity are potential threats to this species.

### Reference

This species description was adapted, with permission, from:  
Karsten E. Hartel, David B. Halliwell, and Alan E. Launer. 2002. *Inland Fishes of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## **B. Amphibians**



## Jefferson Salamander (*Ambystoma jeffersonianum*, State Special Concern)

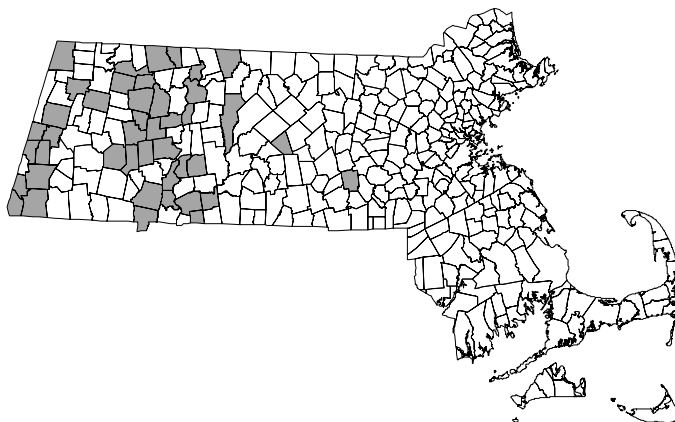
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S3	Upland Forest, Vernal Pools	State List; NE F&W Agencies

### Species Description

Jefferson Salamanders are moderately large and slender with very long toes and a wide snout. They are grayish brown to dark brown in color with a lighter bluish-gray underside. There are often pale bluish-gray flecks on the limbs and sides of the body. The males range from 11.0 to 18.5 cm (4.4 to 7.4 in.) in total length, about 50% of which is comprised of a strongly compressed tail. Adult females have a total length of 12.9 to 19.6 cm (5.1 to 7.8 in.), with slightly shorter, non-compressed tails. During breeding season, they appear less slender than the males due to their burden of eggs. The larvae have short stubby bodies and very large heads with an unpigmented throat and chin. The larvae's backs are marked with pairs of black spots separated by a mid-dorsal black line, and the sides of their bodies are marked with a mid-lateral row of lighter spots.

### Distribution and Abundance

There have been 76 recent occurrences of Jefferson Salamander in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Jefferson Salamander

### Habitat Description

Jefferson Salamanders prefer to reside most of the year in well-drained, upland, deciduous or mixed forest, within 250 to 1600 meters of a small vernal pool or pond, commonly surrounded by alder, red maple, buttonbush, and dogwood. They hide beneath leaf litter, loose soil, and stones, or in rotting logs, rodent burrows, or subterranean burrows which they excavate.

### Threats

The major threat to this species — and to most salamanders in general — is the loss of wetland breeding habitat to draining, development, and other causes. The protection of vernal pools (the breeding habitat) alone is not sufficient to insure the survival of populations, as the animals spend most of their lives in surrounding upland habitats that are often subject to development pressure. Some populations may also have been reduced or lost due to foot and road traffic, over-collection, and pesticides or other hazardous substances. Studies on the effects of acid rain on salamander eggs and larvae have been contradictory, and further studies must be conducted to resolve this issue. Vernal pools and breeding ponds must be protected not only from draining, filling, and development, but also from degradation in the form of road and lawn run-off.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1994. Jefferson Salamander (*Ambystoma jeffersonianum*) Fact Sheet.

## Blue-spotted Salamander (*Ambystoma laterale*, State Special Concern)

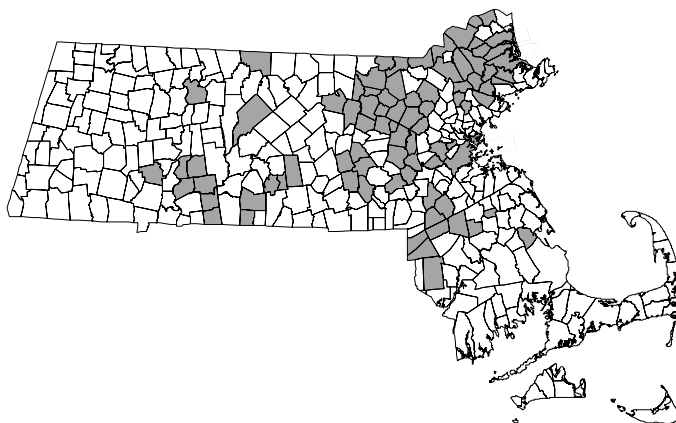
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Upland Forest, Vernal Pools	State List; NE F&W Agencies

### Species Description

Blue-spotted Salamanders have a long, slender body, short limbs with long digits, and a narrow, rounded snout. They are characterized by dark blue to black dorsal pigmentation with a paler ventral surface, brilliant sky-blue spots or specks on the lower sides of the body, and black pigmentation surrounding the vent. The tail is long and laterally compressed, averaging 44% of total body length. During the breeding season, males are identifiable by a swollen vent area caused by enlarged cloacal glands. Adults range from 9.8 to 12.7 cm (3.9 to 5.0 in.) in total length. Larvae are olive-green to black and have a long dorsal fin that extends from behind the head along the back and tail.

### Distribution and Abundance

There have been 160 recent occurrences of Blue-spotted Salamander in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Blue-spotted Salamander

### Habitat Description

Blue-spotted Salamanders require moist, moderately shaded environments; they favor northern hardwood/hemlock forests occurring in glaciated areas having depressions available for seasonal flooding. The resulting vernal (temporary) ponds necessary for breeding and egg laying are seldom more than 30–40 cm (12–15 in.) deep. Ponds need to be full of dead and decaying leaves for cover, and overhanging bushes and grass for egg deposition. Roadside drainage ditches, small kettle holes, and temporary pasture ponds also provide habitat when flooded in the spring.

### Threats

The major threat to this species — and to most salamanders in general — is the loss of wetland habitat to draining, development, and other causes. The protection of vernal pools (the breeding habitat) alone is not sufficient to insure the survival of populations, as the animals spend most of their lives in surrounding upland habitats that are often subject to development pressure. Some population declines may also be attributed to foot and road traffic, over-collection, and pesticides or other toxic chemicals. Studies on the effects of acid rain on salamander eggs and larvae have been contradictory, and further studies must be conducted to resolve this issue; however, it appears that Blue-spotted Salamanders from eastern Massachusetts are highly tolerant of acid conditions and can hatch successfully down to a pH of 4.0.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1994. Blue-spotted Salamander (*Ambystoma laterale*) Fact Sheet.

## Marbled Salamander (*Ambystoma opacum*, State Threatened)

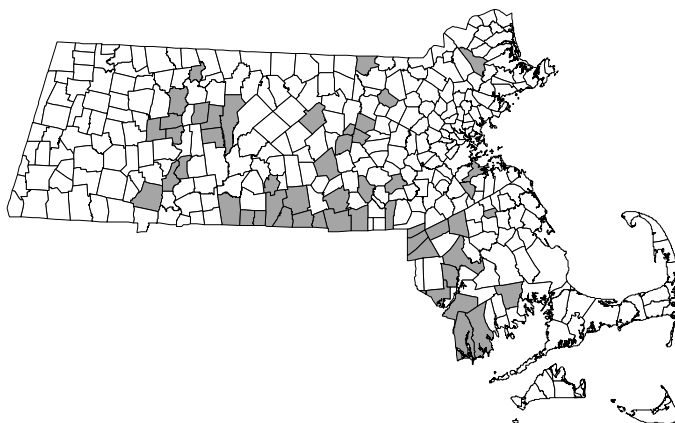
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Upland Forest, Vernal Pools	State List

### Species Description

The Marbled Salamander is short and stout, with a stocky body, short limbs, and a broad, rounded snout. The front limbs have four digits, while the back back legs have five. The dark brown to black background dorsal color is splashed with bold silver-white or grey bandlike markings — the “marbled” effect which earned the salamander its common name. Sometimes the cross-banding is incomplete, forming stripes on the back, sides, and tail. The ventral coloration is uniformly dark gray. Unique among the New England salamanders, Marbled Salamanders exhibit sexual dichromatism; the males have brilliant white markings, while the females are dull grey. Larvae are very dark dorsally with a row of light spots down each side. The underside of the chin is stippled with black; the throat is white. Recently-transformed juveniles average about 4 cm (1.5 in) in total length and have a dark grey to brown coloration with tiny silver flecks scattered over the dorsal area. As the animal matures, these flecks elongate to form the characteristic adult pattern. Adults vary in length from 9 cm (3.5 in) to 10.75 cm (4.25 in.), with the males slightly shorter than the females.

### Distribution and Abundance

There have been 78 recent occurrences of the Marbled Salamander in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Marbled Salamander

### Habitat Description

Marbled Salamanders are largely terrestrial and generally occur in deciduous to mixed woods of the southern hardwood type, dominated by oak and hickory species with White Pine. They can live in a variety of habitats including moist, sandy areas and dry hillsides. They hide beneath surface materials such as logs, bark, boards, stones, and drift that piles up along the margins of streams. Wooded vernal pools or shallow depressions are required for breeding sites.

### Threats

In Massachusetts, the Marbled Salamander is near the northern limit of their range, which no doubt contributes to its rarity in the state. Furthermore, the species is difficult to locate and census accurately. Although the species is found throughout Massachusetts lowlands, the populations are very small and localized. For as yet unknown reasons, many vernal pools do not support them. The major threat to this species is the loss of wetland habitat to development and urbanization. The protection of vernal pools (the breeding habitat) alone is not sufficient to insure the survival of populations, as the animals spend most of their lives in surrounding upland habitats that are often subject to

development pressure. Some population declines may be attributed to heavy road traffic near breeding pools, over-collection, and pesticide application or other toxic chemicals. Studies on the adverse effects of acid rain on salamander eggs and larvae have been contradictory, and further studies must be conducted to resolve this issue.

**Reference**

Massachusetts Natural Heritage & Endangered Species Program. 1994. Marbled Salamander (*Ambystoma opacum*) Fact Sheet.

## Spring Salamander (*Gyrinophilus porphyriticus*, State Special Concern)

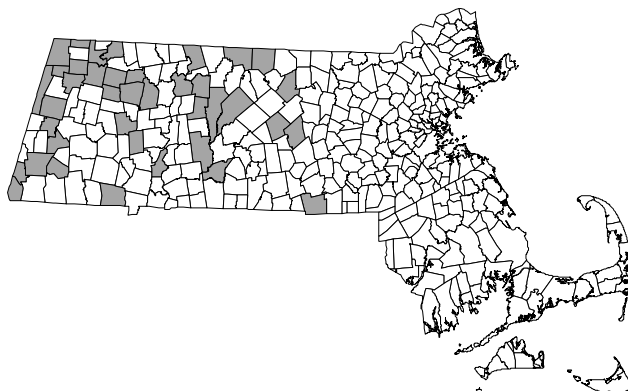
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Small Streams, Riparian Forest	State List

### Species Description

The Spring Salamander is the largest of the lungless salamanders in New England. The adults are 12–19 cm long (5–8 in.), with the females slightly smaller than the males. The ground color of the skin is yellowish-brown with reddish or salmon tinges, and darker net-like mottling on the sides, back, and tail. With age, the ground color darkens and the mottling becomes more distinct. A light line bordered with gray begins at the eye and curves down over the nose and through the nostril. The tail has a prominent, knife-like keel on the top, which aids this aquatic species in swimming and gas exchange. Costal grooves are conspicuous, with most individuals having 17. The underside is flesh-colored except where the liver, showing through the transparent skin, imparts a bluish cast. The tips of the toes and the knee and elbow joints are sometimes conspicuously darker than the rest of the legs.

### Distribution and Abundance

There have been 59 recent occurrences of the Spring Salamander in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Spring Salamander

### Habitat Description

The most important elements in the habitat of the Spring Salamander are, first, clear, cold, alkaline or slightly acidic water in springs, streams and lakes, and, second, logs or stones under which to hide. It will not survive in warm or muddy waters or in streams that have been polluted by run-off. This species is typically found in undisturbed, high-relief mountain streams, but also in less steep, cool seeps and springs in forested areas. During the winter, Spring Salamanders will remain in wet, unfrozen substrate or burrows near, in, or under brooks, where they may remain active all winter. Its association with cool, well-oxygenated habitat may be related to its anatomy. The Spring Salamander has no lungs; its oxygen needs must be met by absorbing oxygen through its moist skin and the membranes in its throat. This species is restricted to only those streams with an ample oxygen supply.

### Threats

The principal threat to this sensitive species is degradation of its cold water habitats. Pollution in the form of road and agricultural run-off and siltation from construction and logging must be strongly discouraged if this species is to be maintained. Water tables — and particularly the groundwater flows that result in springs — must be scrupulously guarded against alteration, as the species often survives the warmest periods of the year (when some streams become too warm to support it) by retreating into spring seeps along the edges of main streams.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1994. Spring Salamander (*Gyrinophilus porphyriticus*) Fact Sheet.

## Four-toed Salamander (*Hemidactylium scutatum*, State Special Concern)

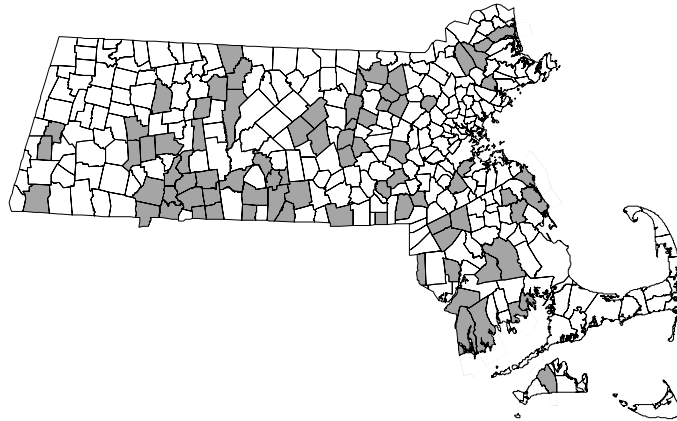
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Upland Forest, Vernal Pools, Peatlands	State List

### Species Description

The Four-toed Salamander is the smallest salamander found in Massachusetts and is easily identified by three distinctive characteristics. As its name implies, this salamander has only four toes on the hind feet (unlike most of the terrestrial salamanders, which have five), a very distinct constriction at the base of the tail, and its belly resembles bright white enamel speckled with black. The dorsal coloration is reddish brown, fading to a gray or almost black color along the sides and into a white belly covered with black speckles the size and shape of coarse ground pepper. The body of the Four-toed Salamander is slender with 13 or 14 costal grooves. Adult males range from 5–7.6 cm (2–3 in) in total length; females are slightly larger, ranging from 6.2–8.9 cm (2.8–3.5 in).

### Distribution and Abundance

There have been 116 recent occurrences of Four-toed Salamander in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Four-toed Salamander

### Habitat Description

Breeding habitat, in the form of wetlands with hummocks of grasses, sedges or wet moss (usually sphagnum moss) adjacent to slow moving streams or pools of standing water, is an important factor limiting the occurrence of Four-toed Salamanders throughout their range. In Massachusetts, this species breeds in bogs, swamps dominated by red maple and Atlantic white cedar, vernal pools, and other perennial wetlands with sphagnum or other mosses. Larvae are found in small pools and slow-moving streams associated with nesting areas. The adults are terrestrial and are generally found in forested areas near their breeding habitat. Four-toed Salamanders take refuge in wet moss, under fallen logs and other objects, in rotting wood, under stones or in the leaf litter. Distribution is limited to areas that provide both breeding and upland habitats in close proximity.

### Threats

The greatest threat to the Four-toed Salamander is habitat destruction resulting from road construction, development, and timber harvesting in and around boggy wetlands, peat lands, and forested wetlands. In particular, suitable nesting substrate — sphagnum hummocks abutting pools of water deep enough for larval survival — may be limited, even within relatively large wetlands. Unlike other salamanders whose reproduction has been adversely affected by acid precipitation, the Four-toed Salamander may have some tolerance in this area.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1994. Four-toed Salamander (*Hemidactylium scutatum*) Fact Sheet.

## Eastern Spadefoot (*Scaphiopus holbrookii*, State Threatened)

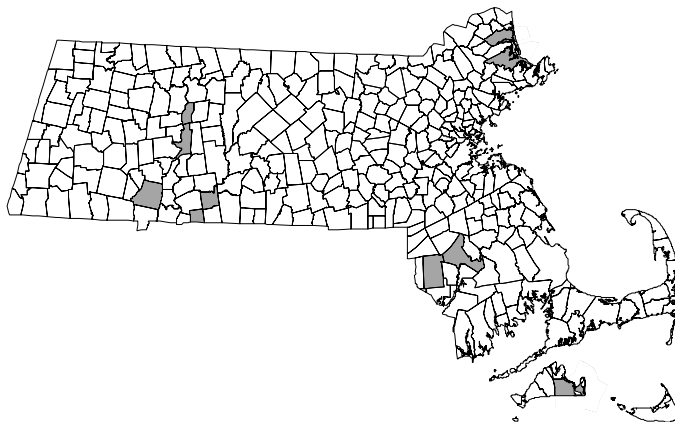
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Upland Forest, Vernal Pools	State List; NE F&W Agencies

### Species Description

The Eastern Spadefoot toad, only 1.75 to 2.25 inches long (4.4-5.7 cm), is a short-legged, squat, big-headed toad. The unmistakable cat-like, vertically elliptical pupils are distinctive. The skin is fairly smooth and scattered with small tubercles or “warts.” Colors are somber, grayish or blackish-brown with olive. Two yellowish lines originate from each eye and run down the back to form a lyre-shaped pattern. Another light line runs along each side of the body. The toad’s name comes from the horny, sharp-edged, sickle-shaped “spade” on the inner surface of the hind foot that is used for digging.

### Distribution and Abundance

There have been 52 recent occurrences of the Eastern Spadefoot in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Eastern Spadefoot

### Habitat Description

This burrowing species requires dry soils, either sand or sandy loam, characteristic of Pitch Pine/Scrub Oak natural communities and coastal oak woodlands, with sparse shrub growth and scattered temporary pools. It prefers areas with leaf litter. Colonies of this toad may occur in farmland or within the floodplains of major rivers.

### Threats

Museum specimens and literature sources attest to the former widespread status of this species. Several factors contribute to the current rarity of the species in Massachusetts. Eastern Spadefoots reach the northern edge of their range in the state, on Plum Island. Destruction of suitable habitat by development or other alterations is perhaps the major contributor to the species' Threatened status; Spadefoot populations have been extirpated by development from Middlesex County, inland Essex County, and parts of Martha's Vineyard. In addition, many individuals are killed crossing roads, particularly during the breeding season. The species is also vulnerable to pesticides, as it appears to have been extirpated on Nantucket after World War II by the use of DDT.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1986. Eastern Spadefoot (*Scaphiopus holbrookii*) Fact Sheet.

## Northern Leopard Frog (*Rana pipiens*, no state or federal status)

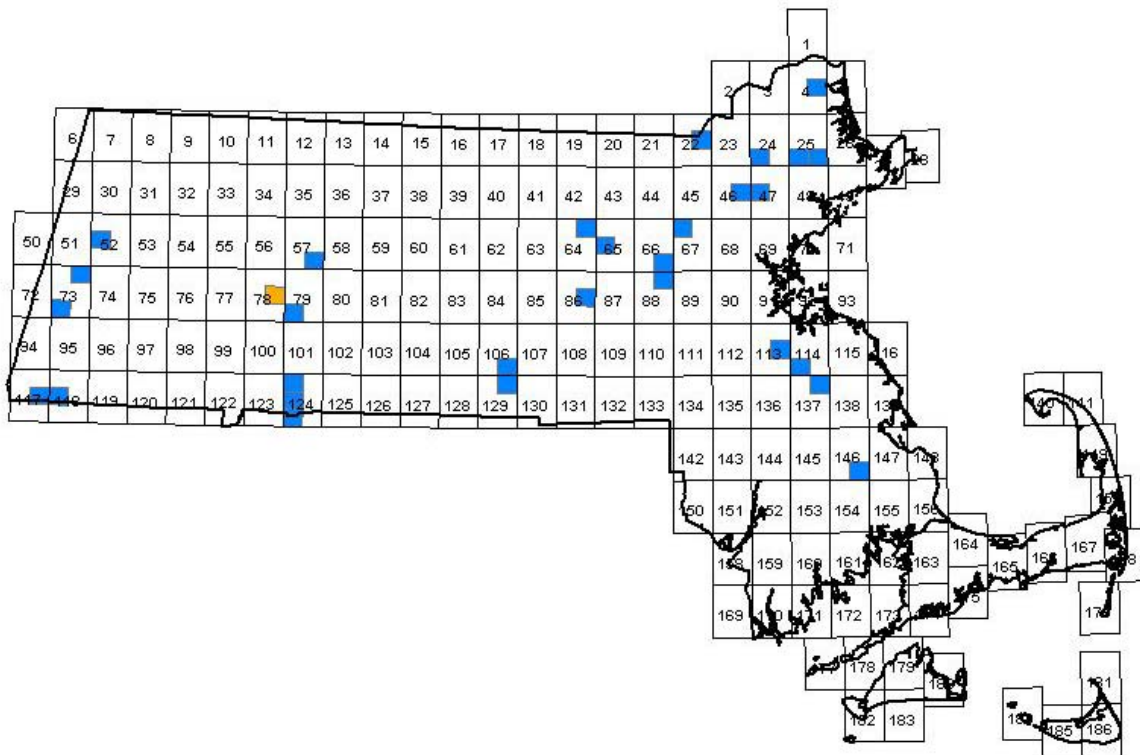
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S4	Lakes & Ponds, Small Streams, Peatlands, Marshes & Wet Meadows	NE F&W Agencies

### Species Description

The Northern Leopard Frog is a slender, medium-sized frog, with both sexes ranging from 5.2 to 9.5 cm in snout to vent length. Females are typically larger than males. Northern Leopard Frogs have light spots on a dark-colored body that can be adaptively changed from shades of green to brown, so that this species may camouflage itself within its surrounding habitats. The Northern Leopard Frog has two or three rows of unevenly spaced rounded spots on its legs, that when the animal is sitting, can appear as several elongated rounded bands along on the legs. The underside of this species is typically a light white or gray and unmottled.

### Distribution and Abundance

The Northern Leopard Frog occurs statewide in Massachusetts, except in Barnstable, Dukes, and Nantucket Counties. Due to the widespread release of leopard frogs from extra-limital sources, their original distribution and native status is uncertain (Cardoza and Mirick 2002). As part of the Massachusetts Audubon Herp Atlas Project occurring from 1992 through 1998, the Northern Leopard Frog was reported and confirmed from a relatively well distributed 25 of the 186 state quadrants (13% of the quadrants). One additional, but unconfirmed, quadrant was reported near Northampton (Jackson, pers. comm.).



**Massachusetts Quadrants with Occurrences of Northern Leopard Frog During Massachusetts Herp Atlas Project, 1992-1997**



## **Habitat Description**

The Northern Leopard Frog is a semi-terrestrial frog that spends much of the summer months in open wet meadows, fields, marshes, and damp wooded habitats, before it returns to permanent water bodies in the fall and winter months to hibernate and to breed the following spring to breed. Over-wintering habitat for this species includes ponds, lakes, and streams, where they remain submerged under substrate debris or within excavated hibernation pits several inches in depth. Laboratory testing has indicated that hibernation activity of the Northern Leopard Frog is triggered by an ambient air temperature of 1.5°C (35°F).

Breeding habitat within permanent water bodies typically occurs in the shallows and along the margins of these water bodies, where emergent aquatic vegetation and food sources are abundant, and there is a relatively stable ambient air temperature regime.

## **Threats**

Habitat destruction, succession to closed-canopy woodlands, over-collecting, and atmospheric deposition of pollutants are probable threats to Northern Leopard Frogs, but specific threats to this species in Massachusetts are not well-known.

## **References**

- Cardoza, J., and P. Mirick. 2002, revised. MassWildlife State Reptiles and Amphibians List (3<sup>rd</sup> Edition). Massachusetts Division of Fisheries and Wildlife, Westborough, Massachusetts.
- Hunter, M., A. Kalhoun, and M. McCollough. 1999. *Maine Amphibians and Reptiles*. The University of Maine Press, Orono, Maine.
- Jackson, S. 2005. Personal communication re Massachusetts Audubon Society Herp Atlas Project, Northern Leopard Frog Quadrant Data.

## **C. Reptiles**

## Loggerhead Seaturtle (*Caretta caretta*, State Threatened, Federal Threatened)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S1	Marine & Estuarine Habitats	Federal List; State List; Globally Rare

### Species Description

Loggerheads are very large sea turtles with a heart-shaped carapace and a large broad head. They are identified most easily by their reddish-brown color; this separates them from other sea turtles. The loggerhead may also have an olive tinge and may have a yellow outline on its scutes. The average adult size ranges from 28-84 inches and up to around 300 pounds. Individuals weighing up to 500 lbs. have been reported.

### Distribution and Abundance

Data on specific locations of oceanic animals are not recorded by NHESP. In general, Loggerhead Seaturtles are found in the warm waters of the Atlantic Ocean during the summer months. Loggerheads migrate into New England waters in the spring and may enter large river mouths, salt marshes, and lagoons. The loggerhead is the most abundant sea turtle species in New England waters, but it is difficult to estimate the size of the population in Massachusetts waters. Loggerhead Seaturtles do not nest in Massachusetts.

### Habitat Description

Loggerheads are primarily pelagic, but can occasionally be found in shallow bays and estuaries. It appears this species is rarely found in the warmer waters of the Gulf Stream; more often, it is in the cooler waters west of the Stream.

### Threats

In Massachusetts waters, the major threat to Loggerhead Seaturtles is primarily entanglement in fishing gear and nets. Other threats are collisions with boats and mortality associated with eating discarded plastic bags.

### Reference

Ernst, C.H., J.E. Lovich, and R. W. Barbour. 1994. *Turtles of the United States and Canada*. Smithsonian Institution Press, Washington, DC.

## Green Seaturtle (*Chelonia mydas*, State Threatened, Federal Threatened)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S1	Marine & Estuarine Habitats	Federal List; State List; Globally Rare

### Species Description

The Green Seaturtle is named for its green-colored fatty tissue. The carapace is heart-shaped and brownish in color. This species is large: adults weigh approximately 250-450 pounds and have a carapace from 3-4 feet long. Green Seaturtles in New England waters are usually immature and somewhat smaller than these adult lengths and weights, however. The Green Seaturtle has two prefrontal scales or plates between its eyes and paddle-like forelimbs that each have one claw. This species is prized for its edible meat.

### Distribution and Abundance

Data on specific locations of oceanic animals are not recorded by NHESP. Though the Green Seaturtle is chiefly found in the warmer climates of the Atlantic Ocean, it has been known to come as far north as Massachusetts. Those coming this far north are usually juveniles or subadults. Occasional summer migrants will appear in New England waters. There are no data available on the numbers of Green Seaturtles using Massachusetts waters.

### Habitat Description

Green Seaturtles migrate across large expanses of open ocean, but feed in shallow, heavily vegetated areas. Adults are mostly herbivorous, but juvenile turtles are more omnivorous.

### Threats

Besides humans, adult Green Seaturtles have few enemies other than tiger sharks. The major cause of their decline has been the exploitation of nesting and feeding grounds by people. High demand for its eggs and flesh has led to over-harvesting, causing the species' decline and preventing its recuperation. The taking of eggs from nesting sites, destruction of nesting habitat, and entanglement in nets and trawls are all involved in the decline of the Green Seaturtle. Water that is too cold for the turtles may stun them, leaving them vulnerable to washing ashore, injury from fishing gear or boats, and predation.

### Reference

Ernst, C.H., J.E. Lovich, and R. W. Barbour. 1994. *Turtles of the United States and Canada*. Smithsonian Institution Press, Washington, DC.

## Hawksbill Seaturtle (*Eretmochelys imbricata*, State Endangered, Federal Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S1	Marine & Estuarine Habitats	Federal List; State List; Globally Rare

### Species Description

The Hawksbill Seaturtle is a small to medium-sized turtle, with a carapace up to about 44 inches in length. The dark greenish-brown carapace is keeled posteriorly, and the hind edge is serrated. The yellow plastron is hingeless. Compared to other sea turtles, the Hawksbill's head is elongated anteriorly and narrow. The chin, throat, and jaws are yellow; dorsally the head and neck are dark, with light-edged scales.

### Distribution and Abundance

Data on specific locations of oceanic animals are not recorded by NHESP. The Hawksbill Seaturtle does not nest in Massachusetts. The few sightings reported are at sea or of stranded turtles on Cape Cod.

### Habitat Description

Hawksbill Seaturtles inhabit shallow, tropical coral reefs and rocky areas. Occasionally, they are found in coastal bays or estuaries, as well as in the open ocean.

### Threats

It is thought that the Hawksbill Seaturtle, like other sea turtles in Massachusetts, is threatened by entanglement with fishing gear or nets, by collisions with boats, and possibly by ingestion of plastic bags.

### Reference

Ernst, C.H., J.E. Lovich, and R. W. Barbour. 1994. *Turtles of the United States and Canada*. Smithsonian Institution Press, Washington, DC.

## Kemp's Ridley Seaturtle (*Lepidochelys kempii*, State Endangered, Federal Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G1	S1	Marine & Estuarine Habitats	Federal List; State List; Globally Rare

### Species Description

The Kemp's Ridley Seaturtle resembles a small Loggerhead, although the Ridley is quite a bit smaller and more circular. It is also olive-green to gray in color, while the Loggerhead is a reddish-brown. It is the smallest of the Atlantic sea turtles. Kemp's Ridley Seaturtles weigh 80 to 100 pounds and the maximum carapace length is about 2 feet. The young are dark gray with a short streak of light gray or white along the edge of the front flipper. The Kemp's Ridley Seaturtle is the most endangered sea turtle; almost all of them hatch from a single nesting site in Rancho Nuevo in Tamaulipas, Mexico. In 1947, there were an estimated 40,000 females nesting at this site; by the mid-1980s, there were only 500-750 nesting there.

Little is known about the behavior and ecology of the Atlantic Ridley. Mating and nesting occur from April to July. It is believed that this species reaches sexual maturity in the wild between 10-12 years old. Incubation is 45-60 days. Like other sea turtles, sex is determined by the nest temperature during incubation. Higher temperatures (above 29°C) produce mostly females; lower temperatures (below 29°C) produce mostly males. Hatchlings will emerge from the nest and head for the sea. They are dark gray to black, with a white border on both flippers and the carapace. It is believed that the first two years of their lives are spent floating among drifting patches of sargassum weed in the Gulf of Mexico.

Adult Kemp's Ridleys are predominately carnivorous, eating crabs, shrimp, barnacles, insects, sea urchins, snails, bivalves, cephalopods, jellyfish, fish, and marine plants and algae. Hatchlings and juveniles are mostly herbivorous, eating floating grasses and other vegetation.

### Distribution and Abundance

Data on specific locations of oceanic animals are not recorded by NHESP. Only juvenile Kemp's Ridleys are recorded from New England. In the late summer through fall, juvenile Kemp's Ridley Seaturtles pass through the shores off New England and can be seen off Massachusetts. Juveniles have been found cold-stunned in Cape Cod Bay.

### Habitat Description

Kemp's Ridleys are usually found in shallow water, less than 50 meters deep. Juvenile Kemp's Ridleys often use sea-grass beds for foraging and resting.

### Threats

In Massachusetts waters, the main threats to Kemp's Ridley Seaturtles are entanglement or capture in fishing gear and stunning by cold water temperatures in the fall. Other threats may be dredging, dumping of dredged material, sewage and stormwater outfalls, and oil spills.

### Reference

Ernst, C.H., J.E. Lovich, and R. W. Barbour. 1994. *Turtles of the United States and Canada*. Smithsonian Institution Press, Washington, DC.

## Leatherback Seaturtle (*Dermochelys coriacea*, State Endangered, Federal Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S1S2	Marine & Estuarine Habitats	Federal List; State List; Globally Rare

### Species Description

The Leatherback is the largest living turtle today. It is easy to recognize thanks to its unique, leather-like carapace which has seven longitudinal keels. The carapace comes to a point just above the tail. The animal is dark brown or black in appearance with paddle-like limbs that lack claws and may or may not have white blotches. An adult's average carapace length is 47-96 inches and it can weigh from 700-1600 pounds. Males have a more concave plastron and are somewhat depressed in profile.

Leatherbacks are carnivorous on invertebrates, but may also ingest algae or vertebrates. The preferred food is the jellyfish (*Scyphomedusae*), but ocean sunfish (*Mola mola*), hydrozoans, sea urchins, octopi, squid, snails, bivalves, amphipods, crabs, tunicates, and small fish are also consumed.

### Distribution and Abundance

Data on specific locations of oceanic animals are not recorded by NHESP. Leatherbacks are known for their pattern of following flotillas of jellyfish, their primary food. They migrate north during the summer and back south in the autumn, apparently following jellyfish. The species is found in the tropical waters of the Atlantic, Pacific, and Indian oceans, and frequently appears in New England waters off Connecticut, Massachusetts, and Maine in summer. It also enters the Mediterranean Sea. In the United States, it is most frequently seen nesting on the coast of Florida, but has been documented nesting as far north as North Carolina.

### Habitat Description

Leatherbacks may occasionally enter the shallow waters of bays and estuaries, but are primarily pelagic.

### Threats

Adult leatherbacks are not protected by their size: they may be attacked at sea by killer whales and large sharks. However, the biggest threats to adult sea turtles are the ones posed by humans. Leatherbacks eat discarded plastic bags, mistaking them for jellyfish, and can die when bags block their digestive systems. Leatherbacks also drown when entangled in commercial fishing gear. Egg poaching by humans is also a threat to their declining population.

### Reference

Ernst, C.H., J.E. Lovich, and R. W. Barbour. 1994. *Turtles of the United States and Canada*. Smithsonian Institution Press, Washington, DC.

## Spotted Turtle (*Clemmys guttata*, State Special Concern)

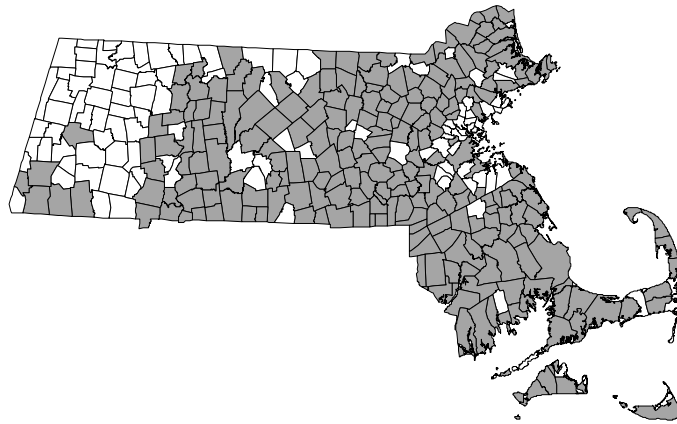
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Vernal Pools, Shrub Swamps, Forested Swamps, Large Unfragmented Landscape Mosaic	State List; NE F&W Agencies

### Species Description

The Spotted Turtle is a relatively small turtle (3-5 inches in carapace length) which gets its name from the bright yellow circular spots that dot its smooth, black carapace. The number of spots varies considerably among individuals; their uniqueness can be used to differentiate among individuals. Hatchlings usually have one spot per scute, although some hatchlings lack spots altogether. The shells of adult turtles may have many spots per scute or may lack spots entirely. The plastron is creamy yellow with large black blotches along the border. In older individuals, these blotches may cover the entire plastron. The skin is gray to black, with occasional yellow or orange spotting on the head, neck, and limbs. The lower surfaces of the limbs and the fleshy parts are pale salmon. Sexual variation is similar to that of other turtle species, in that males have concave plastrons and longer, thicker tails. Spotted Turtle males have a black or dark-colored lower jaw and brown eyes, while the females usually have a yellowish unmarked lower jaw and orange-red eyes.

### Distribution and Abundance

There have been 629 occurrences of the Spotted Turtle in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



**Massachusetts Towns with Recent Occurrences of the Spotted Turtle**

### Habitat Description

Spotted Turtles inhabit a variety of wetland habitats in Massachusetts, including both forested and nonforested wetlands, as well as nearby upland areas. They live in marshy meadows, bogs, small ponds, brooks, ditches, and other shallow bodies of water. They are also often found in Red Maple and Atlantic White Cedar swamps and woodland vernal pools. This species requires a soft substrate and prefers areas with aquatic vegetation. They often cryptically bask along the water's edge, in brush piles, overhanging vegetation and sphagnum mats, and hide in mud and detritus when disturbed. Spotted Turtles nest in sunny, well-drained soil in open meadows, fields, or along roadsides, often traveling long distances to reach suitable nesting areas. Spotted Turtles also often travel between wetlands and traverse various upland habitats while doing so. Many individuals enter upland, wooded habitats in summer, where they aestivate under leaves and forest duff until temperatures decrease in late summer or autumn.



## **Threats**

Threats to the Spotted Turtle are numerous, but development and habitat fragmentation are likely the greatest threats to this species. Increased residential development, construction of many new roads, the alteration of wetlands, and the destruction of upland habitats all severely impact the Spotted Turtle. Another factor is nest predation by skunks, raccoons, and foxes. These “human commensal” predator populations have increased in recent decades, as they receive unnatural food subsidies and other benefits in residential areas. Mortality as a result of road kills also takes a heavy toll on egg-laying females as they travel to their preferred nesting sites. This species is highly prized by the pet trade where they regularly command prices as high as \$400 in Japan and Europe. Illicit commercial exploitation of the species is depleting populations in many parts of their range and may be contributing to the demise of already declining populations in New England.

## **References**

Fowle, S. C. 2001. Priority sites and proposed reserve boundaries for protection of rare herpetofauna in Massachusetts. Massachusetts Natural Heritage & Endangered Species Program, Westborough, Massachusetts.

Massachusetts Natural Heritage & Endangered Species Program. 1994. Spotted Turtle (*Clemmys guttata*) Fact Sheet.

## Wood Turtle (*Clemmys insculpta*, State Special Concern)

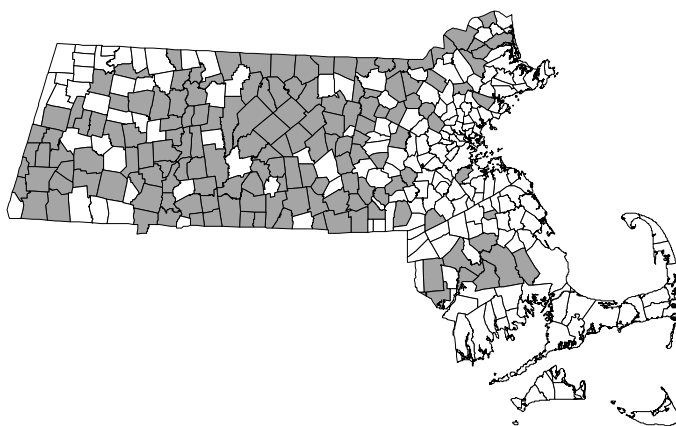
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S3	Large & Mid-sized Rivers, Small Streams, Riparian Forest	State List; NE F&W Agencies

### Species Description

The Wood Turtle is one of the most terrestrial of North American turtles. It is a medium-sized turtle, ranging from 5-9 inches in carapace length. The Wood Turtle is so named because the roundish segments of its carapace resemble a wood-grained cross-section of a branch complete with growth rings. The carapace is characteristically rough and is sculptured with grooves and ridges that rise upward to form individual pyramids. The raised pyramid-like shields, prominent central keel, and slight upward flare of the pointed posterior marginal scutes give this turtle its unique shape. The carapace is brown, often with yellow streaks radiating from the protruding black-flecked centers of the individual scutes. The plastron is bone yellow with an irregular black blotch on the outside posterior corner of each scute. The head, top of the neck and tail, and the outer scales of the legs and the claws are black. The undersides of the neck and legs are orange or red. Males can be distinguished from females by their longer, thicker tail, a concave plastron with a deeply notched rear margin, and prominent scales on the front of the forelegs. Males are generally larger than females. Young are a gray-brown with no red or orange color, the shell is keelless, and the tail is as long as the carapace.

### Distribution and Abundance

There have been 262 occurrences of the Wood Turtle in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



**Massachusetts Towns with Recent Occurrences of the Wood Turtle**

### Habitat Description

The preferred habitat of the Wood Turtle is riparian areas. Slower-moving streams with sandy bottoms and heavily vegetated stream banks appear to support the highest density populations, but the species also occurs in even high gradient trout streams. The bottoms and muddy banks of streams and rivers provide hibernating sites for overwintering, particularly beneath the undercut roots of streamside trees, and sandy or gravelly banks and clearings with ample solar radiation are used for nesting. The Wood Turtle spends most of the spring and summer in meadows and upland forests and returns to the streams in late summer or early fall to mate and overwinter. During the day, it is often seen in woodlands, hayfields, and along roadsides adjacent to streams.

## **Threats**

The decline of this species has been caused by pollution of streams, development of wooded streambanks, the unnatural increase in predation due to human-subsidized predator populations such as raccoons and skunks, and extensive commercial and incidental collection of specimens for pets. Road mortality may well be the greatest threat to this species as the number and density of roads continues to increase and further fragment the remaining habitats. Wood Turtles are also killed during hay-mowing operations.

## **References**

Fowle, S. C. 2001. Priority sites and proposed reserve boundaries for protection of rare herpetofauna in Massachusetts. Massachusetts Natural Heritage & Endangered Species Program, Westborough, Massachusetts.

Massachusetts Natural Heritage & Endangered Species Program. 1994. Wood Turtle (*Clemmys insculpta*) Fact Sheet.

## Bog Turtle (*Clemmys muhlenbergii*, State Endangered, Federal Threatened)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S1	Shrub Swamps, Marshes & Wet Meadows	Federal List; State List; Globally Rare

### Species Description

The Bog Turtle is a small, 3-4 inch turtle with a mahogany, dull brown or black oblong carapace, with faint yellowish or reddish blotches centered in each scute. The plastron is black, irregularly marked with yellow. The most striking feature is a large, bright orange spot behind each ear on the otherwise-black head. The neck is brown and the tail and legs are brownish-yellow or dark brown. In males, the tail is longer and thicker than in females, and the plastron is more concave.

### Distribution and Abundance

There have been three occurrences of the Bog Turtle in Massachusetts documented since 1980 (NHESP database, accessed December, 2004). NHESP does not release any details about the locations of some rare species, including the Bog Turtle, because they are particularly susceptible to collection by humans. One small region of the western part of the state comprises the extent of Bog Turtle occurrences in Massachusetts.

### Habitat Description

Bog Turtles in Massachusetts inhabit low-lying, open, calcareous wetlands, particularly fens. Within these wetlands, the turtles choose small patches of optimal habitat – open, early-successional stages of wet meadows, surrounded by freshwater marsh or wooded swamp. Over time, as the wetlands succeed to shrubbier habitats or are flooded by beaver to form areas of open water, Bog Turtles must move to find new patches of optimal habitat.

### Threats

Since Massachusetts lies on the northern periphery of Bog Turtle range, the species has apparently always been uncommon in the state. In addition, low reproductive productivity, low juvenile survivorship, and a long maturation period all inhibit the long-term viability of the small, isolated populations of this species that occur in this part of its range. In Massachusetts, the species is threatened by the destruction and disruption of suitable wetlands by alterations in groundwater, nonpoint source pollution, invasion by exotic invasive plants, off-road vehicle traffic, and illegal filling or dredging of wetlands. (A population in the Pittsfield area in the early 1960s is believed to have been eliminated when the habitat was converted into a pond.) Range-wide, the species is threatened by collection for the pet trade. Without intensive management of the present habitats to prevent flooding, succession, and/or invasion by exotic plants, the outlook for this species is very poor, as continuing habitat fragmentation is curtailing its ability to move successfully from areas of declining habitat to new ones. Fire suppression and even the decline of grazing animal agriculture may be factors in the loss of suitable habitat.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1987. Bog Turtle (*Clemmys muhlenbergii*) Fact Sheet.

## Blanding's Turtle (*Emydoidea blandingii*, State Threatened)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S2	Vernal Pools, Shrub Swamps, Large Unfragmented Landscape Mosaic	State List; NE F&W Agencies

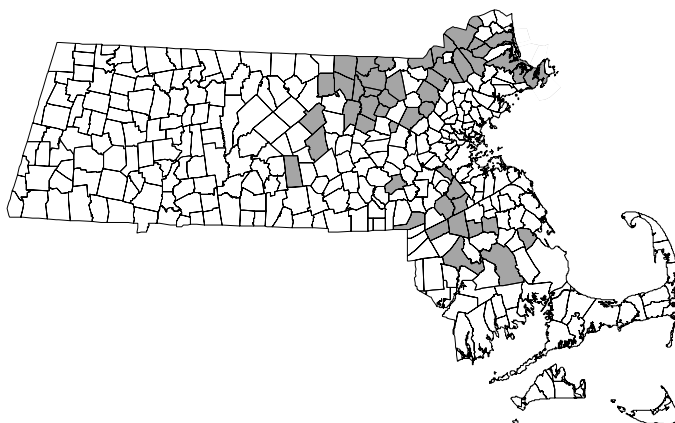
### Species Description

The Blanding's Turtle is a medium-sized, long-necked turtle ranging from 8 to 10 inches in shell length. Its high-domed, helmet-like carapace (top shell) is black with pale yellow spots and streaks. The yellowish plastron (bottom shell) is hinged, allowing at least partial movement of the front section, but the shell does not close completely as in the Box Turtle. The upper jaw is notched, and the yellow throat and chin make it recognizable at a distance. Hatchlings have a brown carapace and a dark brown or black plastron.

The Blanding's Turtle is found primarily in the Midwest, but disjunct populations occur from southern Nova Scotia to Nebraska. In New England, it is found in eastern Massachusetts, southern New Hampshire and southern Maine. Female Blanding's Turtles reach sexual maturity and begin breeding at about 12 years of age. Females select unvegetated nest sites that are composed of hard soil and may travel up to 2 miles to locate a nest site. They are attracted to the smell of disturbed earth. Plowed fields, railroad embankments, and dirt roads provide a suitable substrate. Eggs are usually laid at the end of June; young typically emerge in late September or early October. Clutch size ranges from 6-11 eggs.

### Distribution and Abundance

There have been 70 occurrences of the Blanding's Turtle in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of the Blanding's Turtle

### Habitat Description

Blanding's Turtles inhabit a variety of wetland and upland types. Adults may be found in ponds, rivers, marshes, fens, vernal pools, shrub swamps, forested swamps, and streams. Aquatic habitats for juveniles tend to be shallower and more thickly vegetated than those of adults, although often within the same wetland. Blanding's Turtles are well-suited to both aquatic and terrestrial environments, allowing them to spend much of the active season on land – nesting, aestivating, basking, and traveling between wetlands. They generally return to permanent wetlands in the fall and hibernate there, although they may also hibernate in vernal pools. Most Blanding's Turtle nesting observations have occurred in open, non-forested habitat, such as grasslands, cornfields, dirt roads and roadsides, and fields.

## Threats

The greatest threats to existing populations of Blanding's Turtles are those that increase the mortality (or removal from the wild) of adults and juveniles. While significant and repeated losses of eggs and hatchlings can also lead to population decline, only slight increases in adult and juvenile mortality can have the same effect. Turtles require high survival rates because they – and other long-lived organisms – have evolved to balance their low reproductive rate with a long life span. In other words, they may require several decades of breeding before they succeed in replacing themselves in their populations.

Humans have added sources of mortality to Blanding's Turtle habitat that turtles are poorly equipped to avoid, including cars and trucks, farm machinery and landscape equipment, and the collection of turtles for pets (which is the demographic equivalent of mortality). These sources of mortality also act as barriers to Blanding's Turtle movements, as do obvious physical barriers such as fences, high curbs, railroad tracks, jersey barriers and retaining walls. Roads, for example, fragment turtle habitat and make dispersal more difficult or impossible, depending on width, traffic volume, and construction features of the road. Habitat fragmentation may lead to the isolation of local populations, and isolation can increase a population's risk of extinction. An isolated population cannot receive dispersing individuals from other populations, a process that may be necessary to maintain genetic diversity and to sustain the population.

The loss of diverse wetlands – those containing diverse vegetation communities – also threatens Blanding's Turtles. Different age classes of Blanding's turtles depend on different vegetation densities in their wetland habitats. In addition, hatchlings do not always enter the same wetlands that juveniles and adults inhabit, and they may depend on shallower, temporary wetlands; even dry vernal pool basins. Removal of the forest canopy in the immediate vicinity of seasonal pools can degrade wetland habitat quality by negatively affecting amphibians. The eggs and larvae of amphibians that breed in seasonal pools may be an important seasonal food source for Blanding's Turtles.

Since Blanding's Turtles often nest in and move through open upland habitats, they are vulnerable to activities that typically occur there. Plowing or otherwise excavating upland habitats can destroy nests and kill turtles. Mowing can kill Blanding's Turtles of all ages.

Predators, such as skunks and raccoons, also threaten Blanding's Turtle populations. Up to 100% of nests may be destroyed by predators in a given season. Providing attractants to these predators – such as exposed garbage, pet food, shelter – in or near Blanding's Turtle habitat can adversely affect Blanding's Turtle reproduction. Human presence can also easily disrupt nesting activity. Because a Blanding's Turtle is likely to abandon her nest if disturbed before she has started to lay her eggs, human recreation in Blanding's Turtle habitat can have a negative impact. Recreation (without education and/or area restrictions) also leaves Blanding's Turtles more vulnerable to collection for pets.

## References

Fowle, S. C. 2001. Priority sites and proposed reserve boundaries for protection of rare herpetofauna in Massachusetts. Massachusetts Natural Heritage & Endangered Species Program, Westborough, Massachusetts.

Massachusetts Natural Heritage & Endangered Species Program. 1987. Blanding's Turtle (*Emydoidea blandingii*) Fact Sheet.

## Diamondback Terrapin (*Malaclemys terrapin*, State Threatened)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S2	Salt Marsh, Marine & Estuarine Habitats	State List; NE F&W Agencies

### Species Description

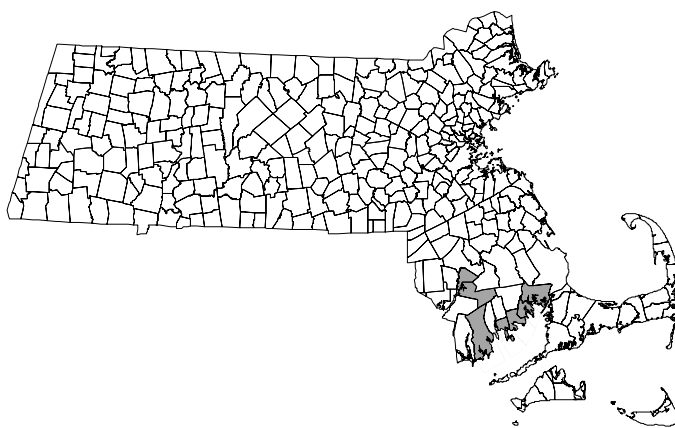
The Diamondback Terrapin is a medium-sized salt marsh turtle. It has a wedge-shaped carapace variably colored in ash grays, light browns, and blacks. Concentric rings pattern the pronounced shell scutes, often forming ridges and bumps. The plastron also varies in color from yellowish-gray and orange to greenish-yellow. Both sexes have grayish to black skin spotted with dark green flecks; males typically have a dark “moustache” on the upper jaw. This turtle has very large, paddle-like hind feet that are strongly webbed. Adult females range from 6 to 9 inches in carapace length; males are smaller, 4 to 6 inches long.

After breeding, females travel from the water during high tides to their nesting sites, which are typically located on high dunes. The journey may be up to 1600 meters long and take as much as 48 hours. The female digs a nest about 5 inches deep and then deposits a clutch of approximately 10 eggs. Laying occurs twice a year, usually in May and again in August. Incubation takes 87-108 days, depending on temperature. When the climate is unseasonably cold, hatchlings (especially those deposited in the second annual clutch) may overwinter in their nest, waiting until the following April and May to erupt from the sand. Those that do not overwinter in the nest may take from 2-11 days to emerge and start the hazardous trip from the nest to the water.

Comprehensive studies of Massachusetts Diamondback Terrapins have revealed nesting behavior and practices atypical of more southern terrapins. On Cape Cod, Diamondback Terrapins were observed nesting during both day and night and on both vegetated and unvegetated dunes. In contrast, southern terrapins nest only during the day and only on vegetated dunes. Eggs laid in unvegetated areas, although more susceptible to wind erosion, receive more heat from the sun, which decreases incubation time. The few hatchlings that survive the immense risks of early life mature at 5-6 years of age.

### Distribution and Abundance

There have been 34 occurrences of the Diamondback Terrapin in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of the Diamondback Terrapin

### Habitat Description

Diamondback Terrapins inhabit marshes which border quiet salt or brackish tidal waters. They can also be found in mud flats, shallow bays, coves, and tidal estuaries. Adjacent sandy dry upland areas are required for nesting. During

the winter, Diamondback Terrapins hibernate on the bottoms of fresh or brackish ponds, streams, and estuary channels.

## **Threats**

There are a number of factors contributing to the decline of Diamondback Terrapins in the state. Originally, this species was nearly wiped out by harvesting for human consumption around the turn of the last century. Today, the harvest of diamondbacks is illegal in Massachusetts, but the species continues to experience high nest mortality and to decline in numbers due to human disruptions and environmental impacts. The largest numbers of Diamondback Terrapins in Massachusetts are located on Cape Cod, where recreational activity often disrupts nesting turtles and hatchlings. Off-road vehicles create ruts deep enough to entrap migrating hatchlings, increasing their chances of being crushed by vehicles as well as increasing their vulnerability to predation by gulls and crows. These predators have been observed standing on the edges of roads and simply scooping up the turtles as they get caught in ruts. Off-road vehicles also interfere with nesting patterns. Female terrapins begin their trips to dune nesting areas, but turn around and go back to the water if they detect any threatening activity such as predators, vehicles, or people. This disrupts the egg-laying process and reduces the viability of the clutch by prolonging the length of time that the eggs are retained by the females. Beach goers and people walking on the dunes also have this effect as well, disrupting the sand substrate so deeply that nests are impaired due to the resulting increased erosion.

An additional cause of mortality observed on Cape Cod is the infiltration into nests and eggs of rootlets from the rhizomes of dune grass. In 1978, the grass *Ammophila breviligulata* penetrated and surrounded half of the nests that were located on vegetated dunes. Predation by maggots of a Sarcophagidea fly also adversely impacts eggs and hatchlings, as do mammalian predators like skunks. Reduction of salt marsh habitat, alteration of water chemistry, loss of sandy beach habitats, and the out-right destruction of dunes all contribute to the decline of the Diamondback Terrapin in Massachusetts.

## **Reference**

Massachusetts Natural Heritage & Endangered Species Program. 1987. The Northern Diamondback Terrapin (*Malaclemys terrapin terrapin*) Fact Sheet.



## Northern Red-bellied Cooter (*Pseudemys rubriventris* pop. 1, State Endangered, Federal Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5T1Q	S1	Lakes & Ponds, Coastal Plain Ponds	Federal List; State List; Globally Rare; NE F&W Agencies

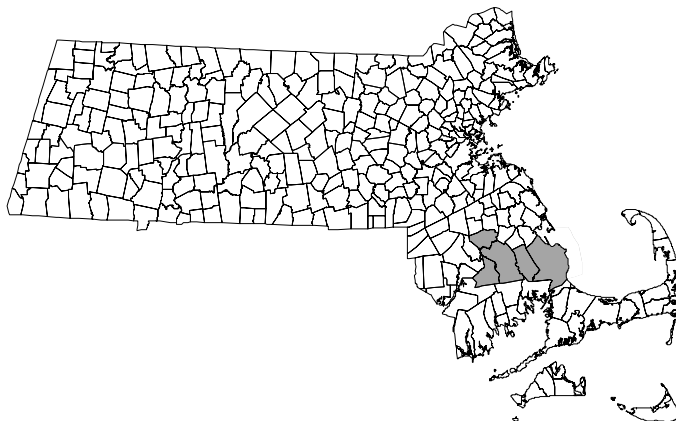
### Species Description

The Northern Red-bellied Cooter is a large, 10-12 inch, variably patterned basking turtle that can weigh up to 10 pounds. The carapace of an adult Cooter is generally black to mahogany colored, with light chestnut to red markings along the margin. The plastron of the males is pale pink overlaid with dark mottling, while females have red plastrons with borders of gray along the seams of the shell plates. The ground color of the head, neck, limbs, and tail is black, marked with yellow or ivory lines. Males have shorter shells, longer tails, and longer front claws than females. In old males, scales on the legs and lines on the soft parts often turn dull red, and males usually become progressively melanistic (blacken) with age.

The Northern Red-bellied Cooter feeds primarily on aquatic vegetation, particularly milfoil (*Myriophyllum* spp.). Especially when young, it may occasionally eat crayfish and invertebrates. Female Red-bellied Cooters are thought to reach maturity at 8-15 years of age (later than the males), although sexual dimorphism is apparent at five to seven years. The life expectancy of this species is believed to be 40-55 years.

### Distribution and Abundance

There have been 33 occurrences of the Northern Red-bellied Cooter in Massachusetts documented since 1980 (NHESP database, accessed December, 2004). In Massachusetts, the species is found only in ponds in the southeastern part of the state. This isolated population of turtles was formerly described as a distinct subspecies, *P. rubriventris bangsi*. The primary range of the Red-bellied Cooter is from the coastal plain of New Jersey south to North Carolina and inland to West Virginia.



Massachusetts Towns with Recent Occurrences of the Northern Red-bellied Cooter

### Habitat Description

In Massachusetts, the Red-bellied Cooter inhabits freshwater ponds of varying sizes that have abundant aquatic vegetation. For nesting, the Cooter requires sandy soil on land surrounding the pond. In late June or early July, the female begins nesting activity. Generally, nests are located within 100 yards of the pond, and usually about 3 feet above pond level. Redbelly Turtles have been found nesting on both vegetated and unvegetated areas, and in disturbed and undisturbed soils.

## Threats

Housing construction has significantly reduced this turtle's suitable nesting habitat and produced long-term changes in ecological processes, such as burning. In the past, areas around the ponds burned periodically, creating Pitch Pine/Scrub Oak natural communities dotted with openings and grasslands. The openings created by fire near Cooter ponds allowed the heat of the sun to penetrate and incubate the turtle eggs. Today, these areas are protected against fire and, as a result, are more frequently surrounded by closed-canopy forests instead of sunny openings. Residential expansion has also introduced pet predation, and increased harassment, collection, vandalism, and road mortality.

In some instances, herbicide use in ponds to decrease pond vegetation or the infiltration of herbicides from adjacent cranberry bogs is believed to have altered the Northern Red-bellied Cooter's food sources and exposed them to chemical contamination. These impacts, combined with the species' late maturation age and low rate of reproduction (less than one-third of females reproduce yearly), have made it difficult for the Red-bellied Cooter to thrive. Hatchling mortality is very high for this species, and at times intense predation on the eggs by skunks, foxes and raccoons (which have increased as residential areas increased) have destroyed as many as half of the Red-bellied Cooter's nests. Bullfrogs, and probably wading birds, pickerel, and bass, prey on the small hatchlings.

## Reference

Massachusetts Natural Heritage & Endangered Species Program. 1995. Plymouth Redbelly Turtle (*Psuedemys rubriventris*) Fact Sheet.

## Eastern Box Turtle (*Terrapene carolina*, State Special Concern)

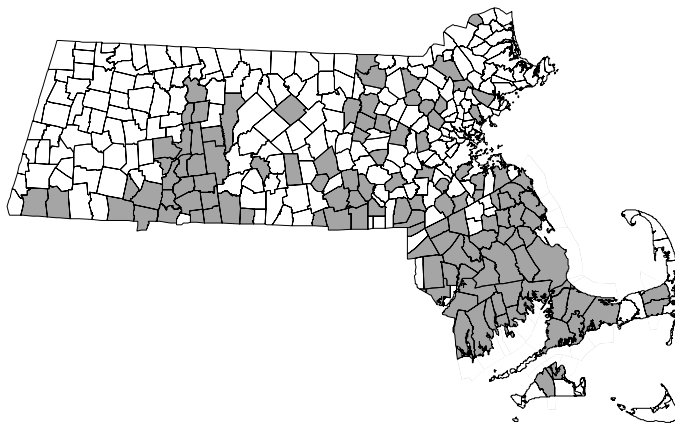
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Pitch Pine/Scrub Oak, Upland Forest	State List; NE F&W Agencies

### Species Description

The Eastern Box Turtle is a small, terrestrial turtle ranging from 4.5-8 inches in carapace length. It is so named because it is the only North American turtle that, when threatened, is able to enclose head, legs, and tail completely within the protective armor of its upper and lower shells thanks to a hinge on the plastron. The adult Box Turtle has a short, broadly oval, high-domed shell with variable markings and coloration. The carapace is usually dark brown or black with numerous irregular yellow, orange, or reddish spots, blotches, or stripes in each carapace shield. The plastron may be tan to dark-brown or black, without any pattern or variably patterned light and dark -- almost a mottled pattern of dark brown/black or tan/yellow, its surface either concentrically ridged or smooth, and divided into two movable portions by a strong hinge. The head, neck, and legs also vary in color and markings but are generally dark with orange or yellow mottling; sometimes solid yellow. Sexual maturity is thought to occur later in New England than in its southern range and may take up to 10 years to attain. It is believed that full growth is reached in about 20 years.

### Distribution and Abundance

The range of the Eastern Box Turtle is from southeastern Maine; south to northern Florida; and west to Michigan, Illinois, and Tennessee. Although the Eastern Box Turtle occurs almost statewide in Massachusetts, the majority of the population occurs in the southeastern section of the Bay State, just west of Cape Cod. There have been 401 occurrences of the Eastern Box Turtle in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



**Massachusetts Towns with Recent Occurrences of the Eastern Box Turtle**

### Habitat Description

The Eastern Box Turtle is a woodland species, although in the northeast it also occurs in pastures and marshy meadows. It is found in both dry and moist woodlands, brushy fields, thickets, marshes, bogs, stream banks, and well-drained bottomland. It prefers open deciduous forests but has also been found on mountain slopes in Massachusetts. In optimal habitats in Cape Cod pine barrens and oak thickets, the species is generally associated with cranberry-dominated swales interspersed with bearberry ground cover, low-bush blueberries, and thickets of bracken fern. Nesting areas may be in hay fields, roadsides, cultivated gardens, lawns, beach dunes, woodland, and around house foundations.

## **Threats**

There are several reasons for the decline of Eastern Box Turtles in Massachusetts: habitat destruction resulting from residential and industrial development; concurrent fragmentation of the landscape by roads; deliberate and inadvertent highway mortality; collection by individuals for pets; destruction of nests and young by skunks, coyotes, foxes, crows, dogs, and raccoons; and genetic degradation of the native stock by imported captives that escape or are released.

The greatest threat to the survival of the Eastern Box Turtle in Massachusetts is the fragmentation and destruction of its habitat. The fragmentation of its habitat by roads can reduce or destroy populations. Due to the decline of farming in Massachusetts, agricultural land is being returned to woodland. A mixture of regeneration, selective cutting and even selective burning of woodland may be beneficial to the Eastern Box Turtle. Large roadless areas of optimal habitat need to be preserved, especially in the Box Turtle's stronghold of Cape Cod and southeastern Massachusetts.

## **Reference**

Massachusetts Natural Heritage & Endangered Species Program. No date. Eastern Box Turtle (*Terrapene carolina carolina*) Fact Sheet.

## Eastern Wormsnake (*Carphophis amoenus*, State Threatened)

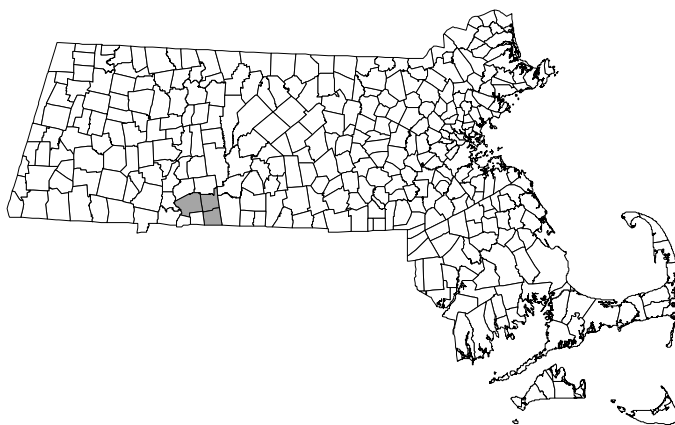
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Upland Forest	State List

### Species Description

The Eastern Wormsnake is a small, fossorial snake resembling an earthworm. It reaches the extreme north end of its range in Hampshire County, Massachusetts. It is very rarely seen, as it is nocturnal and lives much of its life completely underground. Eastern Wormsnakes are uniformly brown above, with a pink belly. Adults average 7-11 inches in length, up to a maximum of 13 inches.

### Distribution and Abundance

There have been seven occurrences of the Eastern Wormsnake in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of the Eastern Wormsnake

### Habitat Description

Typically, Eastern Wormsnakes are found in dry woods with sandy soils covered with Scrub Oak, Black Oak, and Pitch Pine. They may also be in more moist conditions, along mesic forest edges, and many of the Massachusetts records are in well developed, suburban neighborhoods.

### Threats

In Massachusetts Eastern Wormsnakes are restricted to sand plains and Pitch Pine/Scrub Oak woods, which are prime areas for development and are easily destroyed by off-road vehicles. The area of the state where the species is found is almost completely built out, with rapid residential development destroying much of the open land left.

### References

Klemens, M. W. 1993. *Amphibians and Reptiles of Connecticut and Adjacent Regions*. State Geol. and Nat. Hist. Surv. Connecticut. Bull. No. 112.

Massachusetts Natural Heritage & Endangered Species Program. Eastern Wormsnake field report forms.

## Eastern Ratsnake (*Elaphe obsoleta*, State Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Upland Forest, Young Forests & Shrublands, Rock Cliffs/Ridgetops/Talus Slopes	State List

### Species Description

Eastern Ratsnakes are large (by North American standards), heavy-bodied constrictors that frequently grow to six feet or more in length. Over its range, there are many color and pattern variations; in Massachusetts, adults tend to be very dark dorsally, with perhaps some blotching evident. The ventral side is checkerboarded dark and light, typically fading to all dark toward the rear half of the belly, and the chin is light-colored. The dorsal scales are keeled. In cross-section, these snakes are rounded dorsally, but flattened ventrally, rather like a loaf of bread. Adults are relatively docile and easily approached; they are excellent climbers and are often found well off the ground in trees and shrubs. Eastern Ratsnakes are often confused with Black Racers, which are slim and round-bodied, with black dorsally, solid gray bellies, white chins, and smooth scales. Unlike Eastern Ratsnakes, Black Racers are alert, highly active animals that flee very rapidly if approached, and bite aggressively if handled.

### Distribution and Abundance

There have been 10 occurrences of the Eastern Ratsnake in Massachusetts documented since 1980 (NHESP database, accessed December, 2004). NHESP does not release any details about the locations of some rare species, including Eastern Ratsnakes, because they are particularly susceptible to collection by humans. There are five general areas of current Eastern Ratsnake occurrences in Massachusetts, three in the southern Connecticut River Valley, one in southern Worcester County, and one in Bristol County. The Eastern Ratsnake reaches the northeastern limit of its range in Massachusetts.

### Habitat Description

In Massachusetts, Eastern Ratsnakes inhabit sparsely wooded, rocky hills, where they den for the winter in the crevices of south- or west-facing talus slopes or rocky slopes. Often, these den sites are near (within a mile) of old fields or farm fields, where the snakes hunt rodents and birds, in addition to hunting in the woods. Occasionally, they may enter barns or other buildings in search of prey.

### Threats

Direct loss of habitat due to development is likely the greatest threat to this species in Massachusetts. Other major threats include vehicular mortality; killing by humans, because large snakes often elicit fear in people and a docile snake like the ratsnake is easy to kill; disturbance of dens and summer hunting habitat by hikers, off-road vehicles, and other recreationalists; and collecting for pets, as this species is easily caught and kept in captivity.

### References

Klemens, M. W. 1993. *Amphibians and Reptiles of Connecticut and Adjacent Regions*. State Geol. and Nat. Hist. Surv. Connecticut. Bull. No. 112.

Massachusetts Natural Heritage & Endangered Species Program. Eastern Ratsnake field report forms.

## Copperhead (*Agkistrodon contortrix*, State Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Upland Forest, Rock Cliffs/Ridgetops/Talus Slopes	State List

### Species Description

Copperheads belong to the family of snakes known as pit vipers. Copperheads get their name due to their solid, unmarked, coppery-colored head resembling the color of an old copper coin. There is a very thin line on each side of the face that separates the richer copper color of the top of the head from the lighter color of the lip area. The iris of the eye is pale gold, and the pupil is dark and vertically elliptical. On the body there is a series of dark brown to reddish, hourglass-shaped cross bands. These are narrow in the middle of the body and broad to the sides. The ground color ranges from beige to tan. Body markings are continuous over the entire length of the body, including the tail. Juvenile Copperheads are replicas of adults, except that the body has an overtone of light grey and the tip of the tail tends to be yellow. Adult Copperheads are 2-3 feet in length; the newborn young are usually 7-9 inches. Males usually have longer tails, but females grow to greater total lengths (up to 4 feet). There is no reliable external cue to differentiate the sexes. The Copperhead has weakly keeled scales (i.e., a ridge protrudes from the middle of each scale) giving the snake a relatively rough-skinned appearance.

### Distribution and Abundance

There have been five occurrences of the Copperhead in Massachusetts documented since 1980 (NHESP database, accessed December, 2004). NHESP does not release any details about the locations of some rare species, including Copperheads, because they are particularly susceptible to collection by humans. There are two general areas of current Copperhead occurrences in Massachusetts, one in the middle of the state and one in the eastern part.

### Habitat Description

The Copperhead is usually associated with deciduous forest and shows a preference for traprock (basalt) ledges with extensive rock slides below. The Copperhead is fond of moist, damp habitats. Many Copperhead dens are on the fringes of swamps, reservoirs, rivers, and streams. The entrances to the hibernacula (dens) have southern, southeastern, and southwestern exposures, allowing the animals to bask in the spring and fall. The rock slides generally are interspersed with deciduous trees, Virginia creeper (*Parthenocissus* spp.), poison ivy (*Toxicodendron* spp.), lichens, and damp leaf litter. Stands of red cedar (*Juniperus virginiana*), pine (*Pinus* spp.), and hemlock (*Tsuga canadensis*), along with cool, damp meadows, are characteristic of Copperhead habitat. The summering grounds of the Copperhead are near wetlands, wooded swamps and marshes, or lakes and reservoirs. During this time, this species may also inhabit fields and meadows, wet woodlands, and quarries.

### Threats

Destruction of rocky, wooded habitat and summer feeding grounds, excessive removal by collectors, and mortality at the hands of snake hunters and the general public imperil the Copperhead. Its dependence on traditional den sites (used for many years, perhaps indefinitely) makes this species particularly vulnerable to exploitation by humans. Once a den site is discovered by collectors, it can be visited year after year until all its inhabitants are killed or caught. Roads, even in state forests, also place this species at risk due to mortality in crossing, and as road density and the number of vehicles that use them continue to increase, this mortality factor is undoubtedly increasing.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1994. Northern Copperhead (*Agkistrodon contortrix*) Fact Sheet.

## Timber Rattlesnake (*Crotalus horridus*, State Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1	Upland Forest, Rock Cliffs/ Ridgetops/Talus Slopes	State List; NE F&W Agencies

### Species Description

Rattlesnakes belong to the family of snakes known as pit vipers. Only one rattlesnake lives in Massachusetts, the Timber Rattlesnake, a venomous snake. The Timber Rattlesnake, like all rattlesnakes, has a unique structure at the tip of its tail that, when vibrated, makes a rattle-like sound. Though the number of rattles, especially in free-ranging snakes, is variable, there are usually at least one or two. A new rattle segment is added each time the rattlesnake sheds its skin. In Massachusetts, this typically occurs 1-3 times annually during the warmer months. Timber Rattlesnakes have keeled scales, giving the snake a relatively rough-skinned appearance. Adults measure 3-5 feet in length; the newborn young are 8-16 inches at birth. Males usually have longer tails than females, but there is no reliable external cue to differentiate the sexes. Color patterns in the species are extremely variable; some individuals are almost jet black, while others are sulphur yellow with black, brown, or rust-colored blotches separated by cross bands on the back and sides. Some individuals display a light cinnamon band down the center of the back.

In Massachusetts, the active season of the Timber Rattlesnake runs from mid-April to mid-October. Beginning in mid-April, the rattlesnake emerges from hibernation in a rock den and begins basking on ledges during the day. There is little movement or feeding early in the spring and the snakes often appear lethargic. The population is concentrated in and around the hibernaculum with some courtship and mating taking place. After mating, most of the males and at least some of the females begin to migrate up to two or three miles from the den site. There is some question as to whether the snakes actually set up summer feeding territories or if they continually move in a large, oval route that brings them eventually back to the den site early in the fall. In the summer, female Timber Rattlesnakes appear to prefer open forest or edges of fields where temperatures are higher than in surrounding locations. Males, on the other hand, seem to linger in thicker woods where the forest canopy is more complete. In northern latitudes and at the higher elevations where Timber Rattlesnakes are found, females give birth only every second or third year. Because gravid (pregnant) females generally fast for the summer and have little opportunity to eat in the autumn after giving birth, they may be under physical stress for some time and must use the next active season to restore their energy reserves.

The Timber Rattlesnake feeds almost entirely on warm-blooded rodents such as mice, voles, squirrels, shrews, and chipmunks, although it occasionally eats birds. While Timber Rattlesnakes are venomous, they are not aggressive toward humans. Occasionally, people are bitten by rattlesnakes in Massachusetts, but the last known death resulting from a rattlesnake bite was in 1791. Few bites are genuinely accidental: most occur when people attempt to handle or harass the animals.

### Distribution and Abundance

There have been 12 occurrences of the Timber Rattlesnake in Massachusetts documented since 1980 (NHESP database, accessed December, 2004). NHESP does not release any details about the locations of some rare species, including Timber Rattlesnakes, because they are particularly susceptible to collection by humans. There are three general areas of current Timber Rattlesnake occurrences in Massachusetts, two in western Massachusetts and one in the eastern part of the state. Historically, this species was widespread throughout the state, with 21 occurrences recorded in 22 locations.

### Habitat Description

The Timber Rattlesnake prefers remote mountainous terrain characterized by second-growth deciduous or coniferous forest, steep ledges and rock slides, and a high rodent population. In the ledges are fissures and crevices that, presumably, lead to subterranean caverns, in which the snakes hibernate. The entrances to these hibernacula usually have southern, southeastern, or southwestern exposures, and thus warm up quickly in the spring. Scattered concentrations of large and small rock slabs normally cap the top and surround the sides of rattlesnake dens. Timber Rattlesnakes are sometimes found in pine barrens and wetlands near mountains, quarries, old stone walls, and abandoned buildings, and may occasionally be found in fields and pastures.



## **Threats**

Destruction of rocky, wooded habitat, removal by collectors, and mortality at the hands of snake hunters and the general public imperil the Timber Rattlesnake. Rattlesnakes are also killed by vehicles when the snakes cross or bask on roads. Radio-tracking of rattlesnakes in Massachusetts has demonstrated that the snakes can move as far as two miles from a den site. Thus, any construction or use of public and woods roads within two miles of dens can result in rattlesnake deaths. As is the situation with many turtles, due to the late maturity and low reproductive rate of this species, the removal of even a small percentage of adult animals from some populations may put them below a critical threshold from which they cannot naturally recover.

## **Reference**

Massachusetts Natural Heritage & Endangered Species Program. 1994. Timber Rattlesnake (*Crotalus horridus horridus*) Fact Sheet.

## Black Racer (*Coluber constrictor*, no state status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Upland Forest, Pitch Pine/Scrub Oak, Young Forests & Shrublands, Rock Cliffs	Declining in range and abundance

### Species Description

The Black Racer is a large, relatively slender snake, highly active and diurnal in its habits. Adults are solid black except for a white or gray chin, throat and jaw. It is our only large black snake with smooth scales. Young are gray and heavily patterned with large brown, black or reddish blotches down the center of the back; smaller blotches along the sides. The juvenile pattern fades to black after about a year of age. Adults range from 92 to 179+ cm (36 to 70+ in.) in total length. Mating activity and what appears to be some form of male dominance hierarchy determination has been observed in the spring immediately following emergence, but mating also occurs in late summer and fall. Females deposit 10 to 15 eggs in June or July that normally hatch in August or early September. This alert, sight-hunting reptile was once a familiar animal to most state residents. It is noted for displaying curiosity, but it is quick to take alarm and flee rapidly when approached. When cornered or too cold to take flight, it coils and vibrates its tail rapidly.

### Distribution and Abundance

This species appears to range throughout most of the state except Nantucket, but has now undoubtedly been extirpated from most populous areas. It is still locally abundant in some areas, particularly in some southeastern portions of the state, but has declined markedly in range and numbers over the past three decades.

### Habitat Description

This species is a generalist in terms of both habitat and prey, but in New England is probably most closely associated with dry, upland forest habitats. The most abundant numbers appear to reside in the scrub oak/pitch pine barrens and bordering habitats of Cape Cod and Martha's Vineyard. There are several known "artificial" hibernacula harboring numerous individuals in the central part of the state, all created when dams, dikes or mining waste resulted in the creation of very large (1+ acre) piles of rock and gravel. It is unclear if inland populations actually require deep crevice/talus slope hibernacula; they certainly do not in the southeastern portion of the state. The species feeds on a great variety of prey including small mammals, birds, eggs, insects, fish, amphibians and snakes.

### Threats

The major threat to this species is undoubtedly the proliferation of roads and ever-increasing traffic. These active animals have large home range areas, they are frequently on the move, and they will use road surfaces as basking sites. All these factors result in ever-increasing road mortality, and many areas that formerly supported abundant populations now appear devoid of the species. Continued fragmentation of the landscape by roads and development is extirpating this species from large areas of its range, theoretically, but in the absence of baseline data, the degree of threat is impossible to determine. It is unknown if the unnaturally high density populations of "human commensals," such as raccoon, skunk and fox, encouraged by development also play a role in Black Racer decline. Research is required to determine more about the abundance, decline, distribution and core habitat requirements of this species.

### Reference

Klemens, M. W. 1993. *Amphibians and Reptiles of Connecticut and Adjacent Regions*. State Geological and Natural History Survey of Connecticut, Bulletin 112. Connecticut Dept. Environmental Protection, Hartford, Connecticut.

## Hog-nosed Snake (*Heterodon platirhinos*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S4	Grasslands, Pitch Pine/Scrub Oak, Young Forests & Shrublands	NE F&W Agencies

### Species Description

The Hog-nosed Snake is a thick-bodied, moderately large snake with a broad head and upturned snout. Although variable in appearance, most specimens are well patterned with a light background color of yellow, gray, or olive and a regular series of large, rectangular, dark spots down the middle of the back that alternate with dark spots on either side. The species also commonly displays partial or complete melanism; specimens so pigmented from New England appear slate black, rather than jet black. The scales are keeled and the underside of the tail is typically lighter than the rest of the belly. Adults range from approximately 51 to 102+ cm (20 to 40+ in.) in total length. Mating usually takes place in the spring, and females typically deposit 15 to 25 eggs in sandy soil or mulch in June or July. Eggs hatch in August and September.

Behaviorally, the species is often easy to distinguish from all other native snakes because it hisses loudly, flares its neck like a cobra, and inflates its body substantially when threatened (hence the vernacular name “puff adder”). If further pressed, some specimens will thrash and roll on their backs, eject their stomach contents, and “play dead.”

### Distribution and Abundance

The species is not well documented in Massachusetts, in part because it appears to be a naturally “low density” animal throughout much of its range. Most specimens in collections are from coastal areas south of Boston, and in particular from Cape Cod, but based on a handful of documented occurrences and considerable anecdotal material, it likely occurs in all counties **except** Dukes and Nantucket, and possibly Berkshire and Franklin, and may have been extirpated from Essex and Middlesex. It is still locally common at least in portions of Barnstable, Worcester and Plymouth counties.

### Habitat Description

This species is most closely associated with pitch pine barrens, but is also found in other forested and open habitats with well drained, sandy, glacial outwash soils. It is often found around the margins of wetlands within these dry habitats. This is not surprising since Hog-nosed Snakes appear to require an abundance of toads to sustain the adult segment of their populations, and an abundance of small amphibians (in New England probably Northern Spring Peepers (*Pseudacris c. cricifer*) and/or Red-backed Salamanders (*Plethodon cinereus*)) to sustain hatchlings and sub-adults. There is at least one Worcester County site where the species shares a rock pile hibernaculum with a large population of Northern Black Racers (*Coluber c. constrictor*), and it is possible the species may require similar hibernaculum habitat at least within some areas of its range within the state.

### Threats

The major threats to this species — and most medium-to-large snakes in general — are ever increasing habitat loss and road mortality. For this species, habitat loss may include the loss of wetland/lowland habitats it does not require directly, but which are crucial for the reproduction of its prey species. There have undoubtedly been losses of hibernacula to development, but it is unknown how crucial such habitats may be to the species in this part of its range. Some populations may also have been reduced by over-collection, and certainly many individuals are killed by people needlessly frightened by their extraordinary bluff behavior. It is unknown if the unnaturally high density populations of “human commensals,” such as raccoon, skunk and fox, created by development are also a threat to this snake. Studies are required to determine more about the abundance, distribution, and core habitat requirements of the species.

### Reference

Klemens, M. W. 1993. *Amphibians and Reptiles of Connecticut and Adjacent Regions*. State Geological and Natural History Survey of Connecticut, Bulletin 112. Connecticut Dept. Environmental Protection, Hartford, Connecticut.

## Ribbon Snake (*Thamnophis sauritus*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Lakes & Ponds, Small Streams, Peatlands, Forested Swamps, Marshes & Wet Meadows	NE F&W Agencies

### Species Description

The Ribbon Snake is a slender, striped snake, similar in color and pattern to the Common Garter Snake (*Thamnophis sirtalis*). It has three longitudinal yellow stripes, including one down the center of the back, which stand out boldly on a dark, typically reddish-brown to black background. The flanking yellow stripes are separated from the lighter belly area by distinct dark stripes, a characteristic that distinguishes it from the Garter Snake, and a specimen in hand is readily identifiable by an exceptionally long tail that generally accounts for one-third or more of total body length. The scales are keeled and the belly is a light shade of yellow or green. Adults range from approximately 18 to 36+ inches in length. Mating usually takes place in the spring, and females typically give birth to 10 to 12 young in July or August.

When alarmed or disturbed at the edge of open water (a location they often frequent), Ribbon Snakes typically flee across the surface to another shoreline location. This behavioral characteristic (not submerging) can be used as an indicator of identity, but cannot be substituted for actual examination of the animal. Ribbon Snakes appear somewhat gregarious in their habits. They are frequently found in pairs and even aggregations of a dozen or more, particularly in the spring.

### Distribution and Abundance

This species is not very well documented in Massachusetts, at least in terms of abundance, in part because it so closely resembles the more common and familiar Garter Snake; and in part because there has been no concerted effort to ascertain its precise range or specific habitat requirements in the Commonwealth. Many specimens can be found in preserved collections, however, and it is safe to say the species ranges throughout most of the state with the possible exception of the higher elevations in the mountains, and certain of the smaller offshore islands. It is locally abundant in many areas that offer extensive marsh and shallow pond habitats.

### Habitat Description

This species is most closely associated with wetland habitats; more specifically with open hummock marshes, wet meadows, shrub swamps, and the margins of streams and ponds. The species appears to thrive in wetlands habitats offering an abundance of small amphibians (particularly the Green Frog, *Rana clamitans*), although it also feeds on small fish and insects. Exact habitat parameters are unknown, but there is at least anecdotal evidence that an inverse relationship between local abundance of the Ribbon Snake and the Northern Water Snake (*Nerodia sipedon*) may exist. The food preferences of these two species overlap, but whether competition is a significant factor in abundance or population density of the Ribbon Snake remains unknown.

### Threats

The major threats to this species are probably loss of wetlands habitats to development and pollution which removes or reduces the abundance or availability of its prey. It is unknown if upland habitats adjacent to its wetlands habitats play any significant role in its survival. Continued fragmentation of the landscape by roads and developments may hinder recolonization of adequate habitats where the species has been extirpated. It is unknown if the unnaturally high density populations of “human commensals,” such as raccoon, skunk and fox, created by development are also a threat to this species. Research is required to determine more about the abundance, distribution and core habitat requirements of this species.

### Reference

Klemens, M. W. 1993. *Amphibians and Reptiles of Connecticut and Adjacent Regions*. State Geological and Natural History Survey of Connecticut, Bulletin 112. Connecticut Dept. Environmental Protection, Hartford, Connecticut.

## **D. Birds**

## Common Loon (*Gavia immer*, State Special Concern)

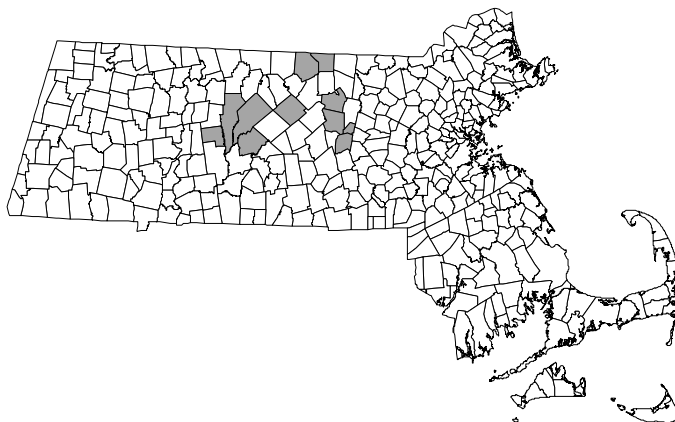
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Lakes & Ponds	State List

### Species Description

The Common Loon, a heavy, goose-sized water bird, varies in size from 28 - 36 inches in length, with a wingspan of 5 feet. It has a thick, black, pointed and evenly tapered bill, held horizontally. In summer, its head and neck are black, glossed with green, with a broad, white collar of black-and-white lines on the sides of its mid-neck. Its back is cross-banded black with white spots. In winter (October to March), its crown, hind neck, and upper parts are grayish to dark brown, its bill is gray, and its throat and under parts are white. The loon's eyes are bright red from a pigment in its retina that filters light and allows the bird to see underwater. Loons have powerful legs and large, webbed feet that are located far back on the body, a feature that aids them in swimming and diving.

### Distribution and Abundance

There have been 21 locations in Massachusetts where at least one pair of Common Loons has been documented during the breeding season since 1980 (NHESP database, accessed December, 2004). Loons returned to nest in Massachusetts in 1975 after being absent as a breeding species in the state for almost a century. They occur statewide as migrants and regularly visit larger lakes and reservoirs inland. In summer they nest at the Quabbin and Wachusett reservoirs, and other large lakes and reservoirs. On Cape Cod, Common Loons are found primarily in salt waters, bays, and estuaries, sometimes many miles offshore. Their principal spring and fall migration route is close to the mainland, crossing the Cape near the Cape Cod Canal.



Massachusetts Towns with Recent Occurrences of Common Loon

### Habitat Description

The Common Loon is more water-dependent than any other inland bird, coming to the shoreline only in spring to breed and nest. It nests on islands or tall aquatic plants in large, clear northern lakes and ponds, and often returns to the same nesting site for years. In winter, the loon inhabits oceans and bays along the coast from Maine to Texas.

### Threats

As the Common Loon builds its nest within a few feet of the shoreline, it is very sensitive to disturbance and will sometimes abandon a nest if repeatedly disturbed by motorboats, canoes, or hikers. Common predators of the loon's eggs and chicks are raccoons, skunks, ravens, and crows.

Lead poisoning, induced by the ingestion of fishing sinkers lost by anglers, appears to be the foremost cause of adult loon mortality on New England lakes. Loons eat minnows being used as bait, and may swallow the hook and sinker, or ingest the sinkers from the lake bottom when swallowing small stones to aid their digestion. When swallowed by

the loon, the lead sinker causes the bird to incur a lethal level of lead that causes the breakdown of its red blood cells and typically leads to kidney failure.

Acid rain, which leads to the contamination of lakes with mercury, aluminum, and cadmium – metals which reduce the reproductive success of loons and render them more susceptible to infectious diseases – is also a threat to this species. Acid rain increases water clarity in some large lakes, but while these lakes attract loons, their acidity may reduce fish populations, thus reducing food availability for loons.

Additional threats to loons are pesticides, shoreline development, growing numbers of recreational boaters, and human alteration of water levels in nesting areas (either flooding or drops in water level).

## **Reference**

Massachusetts Natural Heritage & Endangered Species Program. No date. Common Loon (*Gavia immer*) Fact Sheet.

## Pied-billed Grebe (*Podilymbus podiceps*, State Endangered)

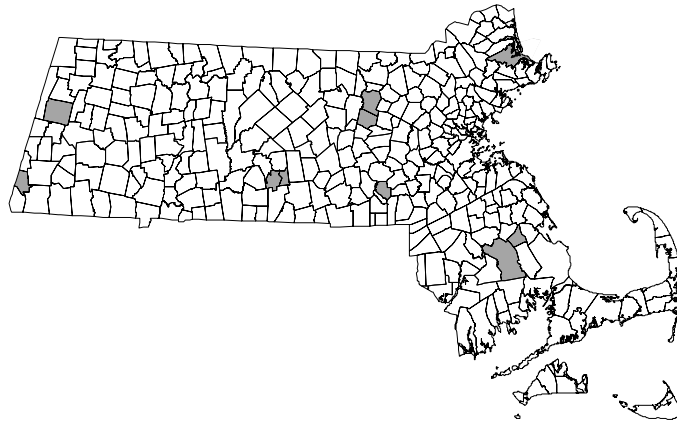
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Marshes & Wet Meadows, Lakes & Ponds	State List; NE F&W Agencies

### Species Description

The Pied-billed Grebe is a stocky waterbird, 12-15 inches in length, with short legs set far back on the body, short wings, a short tail, flat lobes on the toes, and a stout, thick, chicken-like bill. During summer, this bird is uniformly brown with a dusky underside, a fluffy white posterior, and a large black patch on the throat; its bill is bluish-white, encircled near the middle by a black band. During the winter, the throat loses its black patch, and the bill becomes yellowish with no black band. The young are liberally banded with black and white stripes, with a smattering of reddish-brown spots. The call is heard only during the breeding season, and resembles a series of "cow cow cow" sounds. These birds are poor fliers and must run across the water for several yards before becoming airborne; the head is held low during flight.

### Distribution and Abundance

There have been 13 occurrences of breeding-season Pied-billed Grebes in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Pied-billed Grebe

### Habitat Description

Pied-billed Grebes prefer to nest in marshes or on lakes, large ponds, and other wetlands which have an abundant supply of cattails, reeds, and other vegetation that can provide cover and nesting materials. They spend the winter in open lakes and rivers, estuaries, and tidal creeks, usually to the south of Massachusetts.

### Threats

Pied-billed Grebe eggs and newly hatched young are preyed upon by raccoons, mink, snapping turtles, and various avian predators. Nests can be destroyed by alterations in water level (either flooding or drops in water level) or by wakes from motorized and non-motorized boats dislodging nests attached to emergent aquatic plants. In addition to these threats specific to nesting, Pied-billed Grebes are threatened by outright destruction of appropriate wetland habitats; decline and degradation of their prey populations; by pesticides in current use; and by the lingering effects of bioaccumulating pesticides used in the past.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1990. Pied-billed Grebe (*Podilymbus podiceps*) Fact Sheet.



## Leach's Storm-Petrel (*Oceanodroma leucorhoa*, State Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Marine & Estuarine Habitats, Coastal Dunes/Beaches/ Small Islands	State List

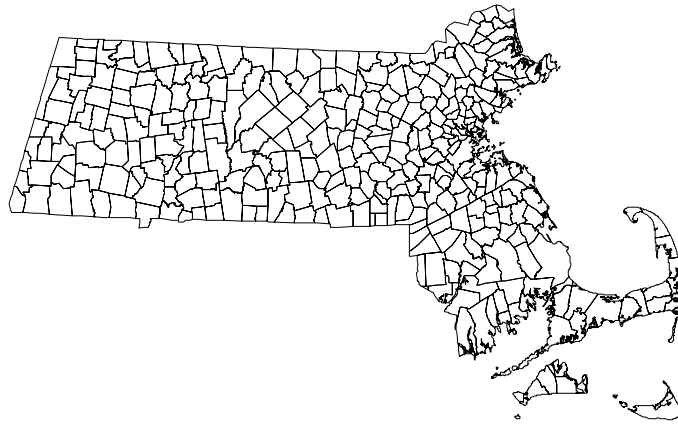
### Species Description

It is a little-known fact that the secretive Leach's Storm-Petrel resides in Massachusetts during the breeding season. The southernmost nesting colonies of this tiny seabird on the eastern coast of North America are at two offshore sites in the state: Penikese Island and Nomans Land. The Leach's is a "tube-nose" (or procellariiform) seabird: its nostrils are located in a tube along the top of the bill. Specialized salt-glands near the eyes function in eliminating excess salt, producing a salty solution that is excreted through the nostrils. This species, along with other tube-nose seabirds, is unusual among birds in that it has a sense of smell, which it uses to locate both food and its nesting burrow. The Leach's habit of flying to and from its nesting burrow only under cover of darkness may be a strategy to reduce predation by gulls and other nest robbers. Numbering in the millions in North America overall, the Leach's is quite rare (and appears to be declining) in Massachusetts, where it is listed as an Endangered Species.

The Leach's Storm-Petrel measures around 7-8 inches in length. Adults are blackish-brown. The crown, flight feathers and tail are slightly darker, and the upperparts somewhat grayer, than the rest of the body. The white rump is usually divided by a dark line, and the tail is forked. The legs and hooked bill are black. There is no seasonal change in adult plumage except for feather wear. Juvenal plumage is nearly identical to that of adults except for pale edges on feathers of upperparts; these edges are present in adult plumage, but are narrower, darker, and less conspicuous. Downy hatchlings are bluish-gray. The bird's vocal repertoire includes the purr call (a long, rising trill punctuated by long notes) and the chatter call (consisting of about 10 staccato notes in 2 groups, descending at the end).

### Distribution and Abundance

There have been two breeding occurrences of Leach's Storm-Petrel in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Leach's Storm-Petrel

### Habitat Description

The Leach's Storm-Petrel nests on islands far enough offshore to lack mammalian predators. Breeding sites must have enough well-drained soil into which Storm-Petrels can burrow, or must contain crevices among rocks. Colony sites range from meadows to coniferous forests. In Massachusetts, it nests only in rock walls on nearly treeless islands. Formerly, however, it excavated burrows in soil on Penikese Island. Foraging habitat is the open sea, especially at fronts and eddies where upwelling brings prey to the surface. Breeding adults usually forage at sites

one to two days travel from the colony (although absences of six days have been recorded), and breeders are known to forage more than 200 km from the colony.

### **Threats**

Island colonies of nesting Leach's Storm-Petrel are threatened with predation by introduced mammals, such as rats, mice, domestic cats, foxes and raccoons, as well as by avian predators such as Great Horned Owl, Short-eared Owl, and various gull species. Pesticides and other chemicals may cause eggshell thinning. Adult storm-petrels are vulnerable to oil spills. Nesting colonies may also be vulnerable to erosion caused by human visitors intent on viewing the storm-petrels.

### **Reference**

Massachusetts Natural Heritage & Endangered Species Program. No date. Leach's Storm-Petrel (*Oceanodroma leucorhoa*) Fact Sheet.

## American Bittern (*Botaurus lentiginosus*, State Endangered)

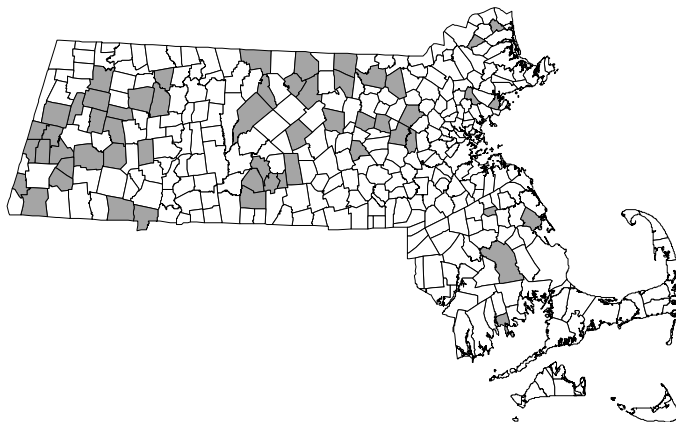
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S2	Marshes & Wet Meadows, Peatlands	State List; NE F&W Agencies

### Species Description

The American Bittern has a long, slender neck with a plump body. Bitterns are approximately 23-33 inches tall and weigh about 13-17 ounces. The plumage of an adult American Bittern is cryptically colored and blends in with surrounding wetland vegetation. Color is generally brown above, with a white and brown streaked chest. Juveniles lack breast streaking. The American Bittern has a long, black patch extending from below its eye down the side of its neck, a unique feature among the heron family. Dark wingtips contrast with the overall brown body. Males and females are similar in plumage, though the males are larger.

### Distribution and Abundance

There have been 63 occurrences of breeding-season American Bittern in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of American Bittern

### Habitat Description

Nesting American Bitterns inhabit shallow ponds or marshes, with the actual nest located in marsh vegetation or in nearby fields, usually in cattails, sedges, or tall grasses. Meadows which are temporarily flooded by rain or beaver activity are also used. American Bitterns are also known to nest in hayfields and sometimes in red maple swamps with considerable woody vegetation.

### Threats

Destruction or degradation of wetland areas has been the primary reason for declining American Bittern populations. Nests may be vulnerable to flooding if they are located within wetlands and, if they are in areas such as hayfields, may be subject to exposure or destruction by mowing.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1986. American Bittern (*Botaurus lentiginosus*) Fact Sheet.

## Least Bittern (*Ixobrychus exilis*, State Endangered)

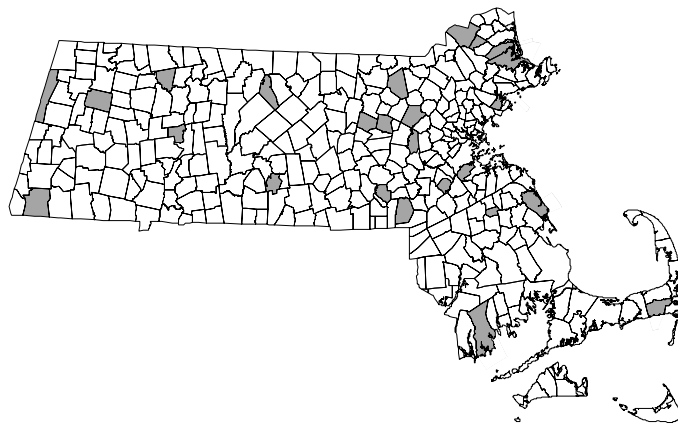
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Marshes & Wet Meadows	State List

### Species Description

The Least Bittern is the smallest member of the heron family, with body length of 11-14 inches and a wingspan of 16-18 inches. The head and back is black and green with buff, and there is a distinct buff patch on each wing. The Least Bittern has only a small crest on its head and a yellow bill. Instead of flying, it often walks or climbs through vegetation.

### Distribution and Abundance

There have been 27 occurrences of breeding-season Least Bittern in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Least Bittern

### Habitat Description

Least Bitterns inhabit freshwater or brackish wetlands that contain emergent vegetation such as cattails, sedges and bulrushes. Shallow wetlands with interspersed emergent vegetation and open water are the best habitats for this bird.

### Threats

Nests can be destroyed by sudden flooding. Raiding of nests by raccoons or other predators also contributes to mortality.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. No date. Least Bittern (*Ixobrychus exilis*) Fact Sheet.

## Bald Eagle (*Haliaeetus leucocephalus*, State Endangered, Federal Threatened)

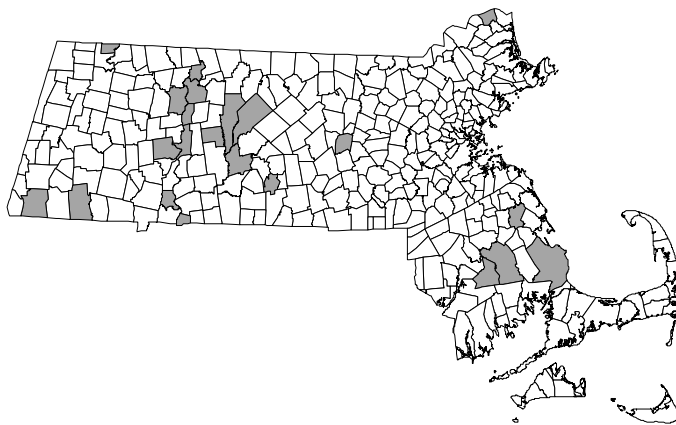
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1	Lakes & Ponds, Large & Mid-sized Rivers, Connecticut & Merrimack Mainstems, Marine & Estuarine Habitats	Federal List; State List

### Species Description

The Bald Eagle is one of the most impressive and majestic birds in North America. It is one of eight species in the genus *Haliaeetus*, the "fish" or "sea" eagles, and is the only member of the genus that regularly occurs in North America. It is also the largest raptor in Massachusetts, attaining a wingspan of 6.5-7 feet, a body length of 3 feet, and a weight of 8-15 pounds at maturity. Both sexes are similar in appearance, but females are notably larger than males. Adult Bald Eagles are distinctively colored with a white head and tail, brown body, pale yellow eyes, and bright yellow beak and feet. The adult plumage is attained at 4 to 5 years of age. The plumage of immature Bald Eagles may vary considerably. Immatures go through a sequence of plumage types before reaching maturity. These plumages include a uniformly dark phase in the first year, followed by phases with various amounts of white on the belly, back, underwings, tail, and head. The eye and beak color also change with age, from dark brown and blackish-gray at hatching to bright yellow in adults. In all feathered stages, the tail is rounded and the lower half of the tarsus is unfeathered. Bald Eagles fly with heavy, deep strokes and soar on flattened wings. In silhouette, the beak, head, and neck are almost as long as the tail.

### Distribution and Abundance

There have been 23 occurrences of territorial pairs of Bald Eagle in Massachusetts documented since 1980 (NHESP database, accessed December, 2004). From 1982 to 1988, forty-one young Bald Eagles from Michigan and Canada were relocated to the Quabbin Reservoir in Massachusetts. As a result of these efforts, Bald Eagles were confirmed as successfully breeding in the state in 1989, after an absence of more than 80 years.



Massachusetts Towns with Recent Occurrences of Bald Eagle

### Habitat Description

Bald Eagles usually inhabit coastal areas, estuaries, and larger inland waters. This species requires a high amount of water-to-land edge, incorporating stands of forest for nesting, trees projecting above the forest canopy for perching, an adequate supply of moderate-sized to large fish, unimpeded views, and reasonable freedom from human disturbance. Wintering eagles require suitable roost trees for communal night roosting. In some cases these roosts may be 20 km or more from feeding areas and are typically located at sites that are protected from the wind by vegetation or terrain, providing a more favorable thermal environment. The use of these protected sites helps wintering birds conserve their critical energy reserves, hence the absence of a suitable night roost can limit the use of otherwise suitable habitats.

## **Threats**

Critical to the survival of the Bald Eagle is the preservation and protection of its wetland habitats and the integrity of its known breeding, roosting, and wintering areas. In addition to these protection measures, preservation of its habitat along its migratory routes is also of great importance. Every effort should be made to eliminate human disturbance in nesting and wintering areas through increased public education and awareness of the detrimental effects on eagle populations. The Bald Eagle is still persecuted by wanton shooting; improved enforcement of current laws is needed to eliminate senseless killing. Lastly, identification and elimination of contaminant problems such as lead, mercury poisoning, indiscriminate poisons set for mammals, pesticides and acid rain must be closely monitored.

## **Reference**

Massachusetts Natural Heritage & Endangered Species Program. 1995. Bald Eagle (*Haliaeetus leucocephalus*) Fact Sheet.

## Northern Harrier (*Circus cyaneus*, State Threatened)

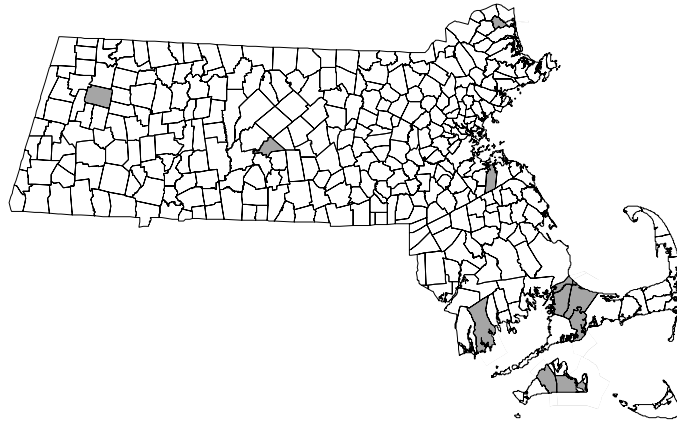
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Marshes & Wet Meadows, Grasslands, Pitch Pine/Scrub Oak	State List; NE F&W Agencies

### Species Description

The Northern Harrier is a slim, long-legged, long-tailed hawk, 16-24 inches in length, with an owl-like face and long, rounded, narrow wings extending up to 46 inches from wing tip to wing tip. Males are pale bluish-gray on the head and upper surface, white on the undersurface, and have black wing tips; the tail has a broad sub-terminal bar with 5-7 narrow dark brown bars. Females are dusky brown on the head and upper surface, and light brown with darker vertical streaks on the lower surface; the tail is dark in the center, becoming paler near the outer edges, and has 5-7 broad brown bars. Both sexes possess a conspicuous white rump patch, white upper tail coverts, light orange-yellow legs, and black bills.

### Distribution and Abundance

There have been 76 occurrences of breeding-season Northern Harrier in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Northern Harrier

### Habitat Description

Northern Harriers establish nesting and feeding territories in wet meadows, grasslands, abandoned fields, and coastal and inland marshes, mostly along the coast. Northern Harriers in Massachusetts are uncommon summer residents or migrants, although they once were much more abundant in the state. Most Harriers in the state which do not migrate south spend the winter in coastal marshes on Cape Cod and the offshore islands. Some Northern Harriers that breed in areas north of Massachusetts may also spend the winter on the offshore islands and along the coast. Northern Harriers are known to share habitat and territory with Short-eared Owls.

### Threats

The most significant factor in the Northern Harrier's decline has been loss of suitable habitat by reforestation of agricultural land, and destruction of coastal and freshwater wetlands. In coastal areas, human disturbance may cause some Harriers to abandon their nests. Natural factors such as prey abundance, prolonged periods of rain (which may destroy nests and eggs), and predation on eggs and nestlings all affect the breeding success of Northern Harriers. In order to prevent further decline in this species' population, it is crucial to protect suitable habitats from development and destruction.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. No date. Northern Harrier (*Circus cyaneus*) Fact Sheet.

## Sharp-shinned Hawk (*Accipiter striatus*, State Special Concern)

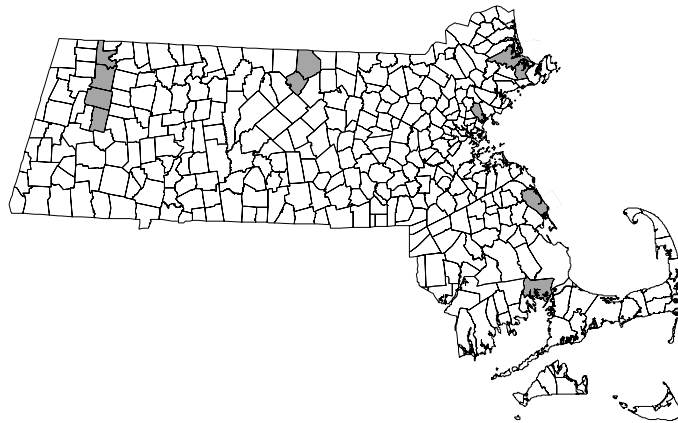
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Upland Forest	State List

### Species Description

The Sharp-shinned Hawk, which is slightly larger than a Blue Jay, is the smallest member of the *Accipiter* family, measuring 10-14 inches in length. It has a slim body; short, broad wings, rounded at the tips; a wingspan of 20-27 inches; and a long, narrow, and usually notched or square-tipped tail. The adult plumage is dark slate-gray above with white underparts finely barred with red-brown. Its head is slate-gray down to the eye-line; white thinly streaked with brown below the eyeline; and the cheeks are red-brown. The tail has three or four bands of dark and light brown of equal width both above and below; white undertail coverts; and a narrow grayish-white tip (terminal band). The eyes of the adult Sharp-shinned Hawk are red and its long stick-like legs are a bright yellow. The sexes have similar plumage, but the females are less bluish above, lighter below, and are noticeably larger than the males. The juveniles and immature adults have brown upperparts splotted with white. Underparts are white splotted with brown.

### Distribution and Abundance

There have been 11 occurrences of breeding pairs of Sharp-shinned Hawk in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Sharp-shinned Hawk

### Habitat Description

The Sharp-shinned Hawk prefers extensive mixed woodlands and coniferous forests containing spruce. In Massachusetts, the Sharp-shinned has been found in stands of Red Spruce (*Picea rubens*) with occasional White Birch (*Betula papyrifera*). Breeding habitat is usually near open areas and in the vicinity of water.

### Threats

In the 19th and 20th centuries, Sharp-shinned Hawks were slaughtered in tremendous numbers by people who erroneously believed that this hawk affected songbird populations. When legal measures were implemented in the early 1900s to protect the Sharp-shinned Hawk, populations increased noticeably. However, when DDT and its associated pesticides were introduced into the environment in the 1950s, the Sharp-shinned faced a serious threat to its well-being. As the pesticides accumulated in its prey and were magnified through the food chain, reproductive failure of predatory birds like the Sharp-shinned resulted. Eggs were destroyed as the shells became too thin to withstand incubation. By the late 1970s, after DDT was banned, Sharp-shinned Hawks appeared to have made a significant comeback from the nationwide decline of the early 1970s.



However, records show that since 1985, the Sharp-shinned Hawk population is once again experiencing serious decline in its Northeastern breeding range of Quebec, the Canadian maritime provinces, New England, and to a lesser extent, Eastern Ontario. It is believed that this decline may be attributed to reproductive failure as a result of acid rain and the control of the spruce budworm. DDT and environmental contaminants have been detected in some birds, possibly as a result of eating pesticide-laden migrant birds returning from South America, but this does not explain why only eastern populations and not midwestern population are affected. In examining the changes in the forests of the Canadian maritime provinces and New England during the past 20 to 50 years, it was noted that the two most evident changes are increased acid rain and the control of spruce budworm.

Another theory regarding the rarity of the Sharp-shinned Hawk in Massachusetts may be due to the lack of appropriate coniferous forests required to support a large population. The Red Spruce (*Picea rubens*) habitat that this bird prefers is limited to the north central and western regions of the state. The secretive and retiring nature of this hawk makes it very difficult to locate, and current population data may not accurately reflect the actual number breeding in the state.

## **Reference**

Massachusetts Natural Heritage & Endangered Species Program. No date. Sharp-shinned Hawk (*Accipiter striatus*) Fact Sheet.

## Peregrine Falcon (*Falco peregrinus*, State Endangered)

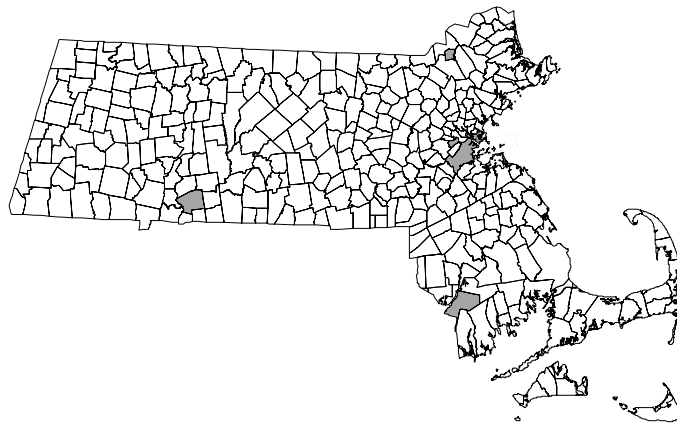
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1	Rock Cliffs/ Ridgetops/Talus Slopes	State List

### Species Description

The Peregrine Falcon is a beautiful raptor with long, pointed wings and a long, slightly rounded tail, capable of diving from great heights at speeds of up to 200 miles per hour. Adults have a bluish-gray to slate-gray back and a buffy-white underside interspersed with black. Adults also have a black crown, black moustache-like markings or “sideburns,” a white throat, a dark bill with a prominent yellow cere, and yellow legs and feet. Immature Peregrines have brown backs and heavily streaked undersides. Peregrines are medium-size falcons, 15-20 inches in length, with a wingspan of 35 to 48 inches. Males are slightly smaller than females.

### Distribution and Abundance

There have been four breeding occurrences of Peregrine Falcon in Massachusetts documented since 1980 (NHESP database, accessed December, 2004). Historically, there were about 15 active aeries in Massachusetts (pre-1955; the last year Peregrines nested in the state); none appear to be in use by Peregrines today.



Massachusetts Towns with Recent Occurrences of Peregrine Falcon

### Habitat Description

Historically, Peregrine aeries in Massachusetts were located on rock cliffs. Currently, most nests or nesting attempts have been on tall buildings, bridges, or large cranes; one current nest is on a natural cliff. All of these sites are near a large body of water, such as a river or lake.

### Threats

Currently, threats to Peregrine Falcons in Massachusetts include disturbance of nesting attempts by people (rock climbers, birdwatchers, or researchers), predation of nestlings or fledglings by Great Horned Owls, collisions with wires or buildings, and the lingering effects of DDT.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1991. Peregrine Falcon (*Falco peregrinus*) Fact Sheet.

## King Rail (*Rallus elegans*, State Threatened)

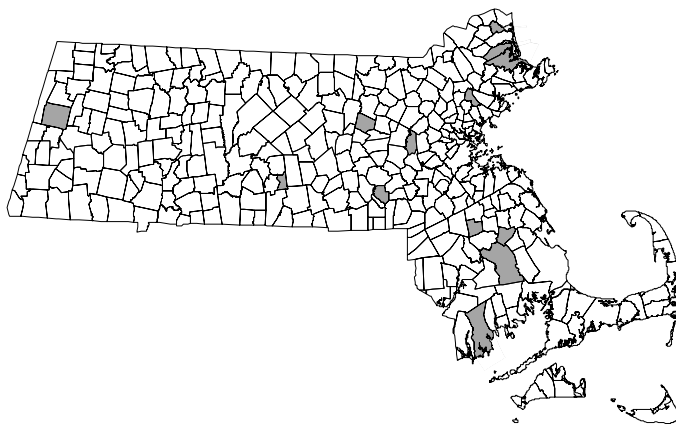
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1	Marshes & Wet Meadows	State List

### Species Description

The King Rail is the largest of the New England rails, measuring 15-19 inches long with a wingspan of 21-25 inches. The King Rail has a plump body, similar to that of a chicken. Its long slender bill curves downward and varies in color from orange-red to dark brown. Upper parts of the King Rail are olive-brown, streaked with brownish black or olive gray. The wings are brown and the upper throat is whitish. Over each eye a brownish-white or brownish-orange line turns to brownish gray behind the eye. The entire chest and sides of the neck are a deep reddish-brown. Male and female are similar in plumage; the male is slightly larger than the female. The call of the King Rail is described as a *jupe-jupe-jupe-jupe-jupe* with the tempo increasing and the volume decreasing as it calls.

### Distribution and Abundance

There have been 12 occurrences of breeding-season King Rail in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of King Rail

### Habitat Description

King Rails are found primarily in shallow water areas with emergent vegetation (cattails, grasses, and sedges) and mud flats. These areas may include hummocky topography and natural swales. The species nests in shallow marshes, ditches, and along roadsides with cattails, sedges or grasses.

### Threats

As with other marsh or wetland birds, preservation and protection of wetland habitats is crucial for the continued viability of King Rails. Another factor wildlife managers must consider is that the King Rail (like the Least Bittern) is a nocturnal migrant. Many illuminated obstructions such as towers, buildings, and lighthouses have been a cause of mortality for this species. Sudden changes in water level near nesting sites can also cause mortality by drowning nests or by leaving them high and dry.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1986. King Rail (*Rallus elegans*) Fact Sheet.

## Common Moorhen (*Gallinula chloropus*, State Special Concern)

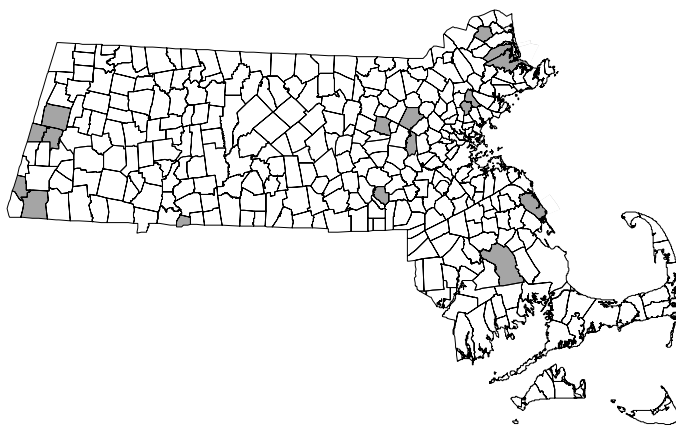
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Marshes & Wet Meadows	State List

### Species Description

This duck-like wetland bird is approximately 13 inches long. The body is slate gray with a prominent yellow-tipped, red bill and a red frontal shield. The tail is cocked up and is white underneath. The call of the Moorhen has been described as a varying cackle or a succession of slow, hen-like clucks. When swimming, the Moorhen rests lightly on the water like a duck, its head moving forward and back, like that of a coot.

### Distribution and Abundance

There have been 21 occurrences of breeding-season Common Moorhen in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Common Moorhen

### Habitat Description

The Moorhen is primarily found in deepwater marshes or wetlands with emergent or floating vegetation.

### Threats

The protection and conservation of wetlands, especially those that are deep water examples with generous amounts of emergent vegetation (cattails, sedges, etc.), is imperative for the continued viability of this species.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1986. Common Moorhen (*Gallinula chloropus*) Fact Sheet.

## Piping Plover (*Charadrius melodus*, State Threatened, Federal Threatened)

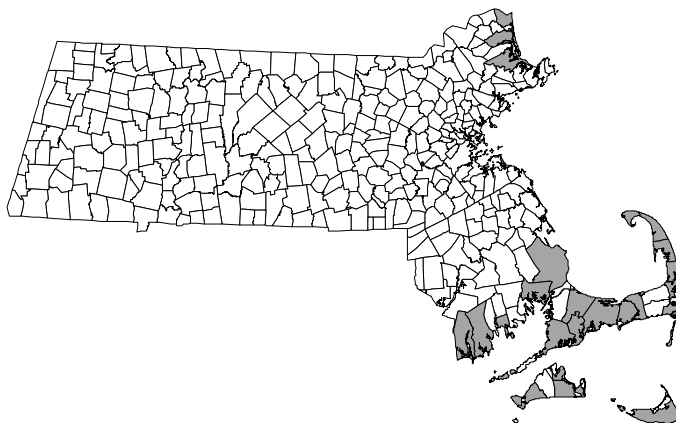
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S2	Coastal Dunes/ Beaches/ Small Islands	Federal List; State List; Globally Rare

### Species Description

The Piping Plover is a small, stocky shorebird with pale brownish gray or sandy-colored plumage on its backside, with a white breast, forehead, cheeks, and throat, a black streak on the forecrown extending from eye to eye, and a black breastband which may not always form a complete circle. This coloration provides the bird with excellent camouflage in sandy areas. The average Piping Plover is 6-7 inches long, with a wingspan of 14-16 inches. The tail is white at the base and tip, but dark in the middle. This plover has yellow-orange legs. Its short bill is yellow-orange with a black tip in the summer, but turns completely black during the winter. In general, females have darker bills and lighter plumage than males. The Piping Plover runs in a pattern of brief starts and stops; in flight, it displays a pair of prominent white wing stripes. Its call is a series of piping whistles.

### Distribution and Abundance

There have been 87 breeding occurrences of Piping Plover in Massachusetts documented since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Piping Plover

### Habitat Description

Piping Plovers in Massachusetts require sandy coastal beaches which are relatively flat and free of vegetation. They prefer the dry, light-colored sand found along the outer coastal shores. Piping Plovers often build their nests in a narrow area of land between the high tide line and the foot of the coastal dunes; they also nest in Least Tern colonies. Access to the ocean is a critical necessity for Piping Plover habitat, since the birds feed exclusively on marine or estuarine organisms which live along the shoreline.

### Threats

Habitat loss due to development of coastal areas and waterways has caused a catastrophic decline in the Piping Plover population over the last 50 years. Predation on eggs and young has also increased due to the growing number of foxes, skunks, raccoons, and other “commensal” predators that thrive in suburban areas. The cryptically colored and nearly invisible eggs and chicks are often unintentionally crushed by off-road vehicles and pedestrians. Continual disturbance of nest sites due to recreational use may lead some breeding pairs to abandon their nests. Severe storms can wash away and destroy eggs. In recent years, the placement of wire enclosures surrounding Piping Plover nest sites has drastically reduced predation at many nest sites. Protection of essential habitat from

development, and restriction of off-road vehicle use in these areas are crucial to maintain a healthy Piping Plover population in Massachusetts.

**Reference**

Massachusetts Natural Heritage & Endangered Species Program. 1990. Piping Plover (*Charadrius melodus*) Fact Sheet.

## Upland Sandpiper (*Bartramia longicauda*, State Endangered)

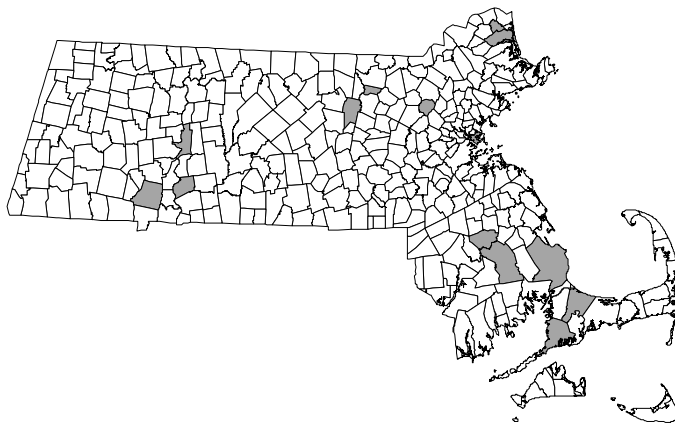
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Grasslands	State List; NE F&W Agencies

### Species Description

The Upland Sandpiper is a slender, moderate-sized shorebird with a small head and large, shoe-button eyes. It has a short, thick, dark-brown bill, a long, thin neck, and a relatively long tail. Its legs are yellowish. It stands about 12 inches tall and has a wingspan of 25-27 inches. The crown is dark brown with a pale buff crown stripe. The rump, upper tail and wings are much darker than the rest of the bird.

### Distribution and Abundance

There have been 14 occurrences of breeding-season Upland Sandpiper documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Upland Sandpiper

### Habitat Description

The Upland Sandpiper inhabits large expanses of open grassy uplands, wet meadows, old fields and pastures. In Massachusetts, it is restricted to open expanses of grassy fields and hay fields, and to the mown grassy strips adjacent to runways and taxiways of airports and military bases.

### Threats

European settlement created extensive nesting habitat through the clearing of the forest for agriculture and grazing. The Upland Sandpiper was common in the 1850s, and at that time was seen in the thousands. Commercial shooting for food reduced its numbers dramatically. Currently, after having been protected from hunting for over 60 years, it is threatened by loss of habitat to development and succession of open lands to forest. The Upland Sandpiper is experiencing a population decline over much of its range, particularly in the Midwest and eastern United States.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1986. Upland Sandpiper (*Bartramia longicauda*) Fact Sheet.

## Roseate Tern (*Sterna dougallii*, State Endangered, Federal Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4T3	S2	Salt Marshes, Coastal Dunes/Beaches/ Small Islands, Marine & Estuarine Habitats	Federal List; State List; Globally Rare

### Species Description

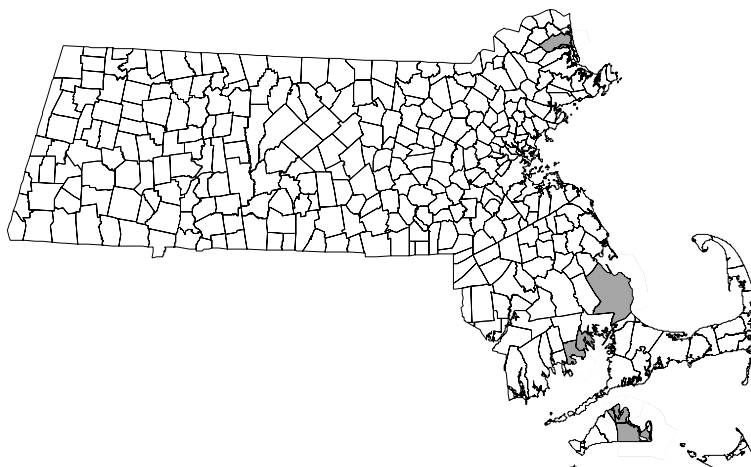
The elegant Roseate Tern, with its long, white tail streamers and rapid flight, alights on Massachusetts beaches in the spring. It tunnels under vegetation to nest within colonies of its more rough-and-tumble relative, the Common Tern, from which it derives protection from intruders. The Roseate Tern is a plunge-diver that feeds mainly on the sand lance, and availability of this fish may influence the timing of breeding. Depredations of plume hunters in the 19<sup>th</sup> century, followed by displacement from breeding sites by gulls and increased predation in the 20<sup>th</sup> century, contributed to a decline in numbers and loss of major breeding sites in the northeast. In a sense, the Roseate Tern is emblematic of the Commonwealth, because for the past century about half the northeastern population has nested in Buzzards Bay and outer Cape Cod. Populations have increased since the 1980s, and several projects are in progress to restore the Roseate to historical breeding locations in Massachusetts.

The Roseate Tern measures 14-17 inches in length. Breeding adults have pale gray upperparts, white underparts (flushed with pale pink early in the breeding season), a black cap, orange legs and feet, and a black bill (which becomes more red at the base as the season progresses). The tail is mostly white, and is deeply forked with two very long outer streamers that extend well past the tips of the folded wings. In non-breeding adults, the forehead becomes white and the crown becomes white marked with black, merging with a black patch that extends from the eyes back to the nape. The down of hatchlings is distinctive: it is grizzled buff/black or gray/black, and is spiky-looking because the down filaments are gathered at the tips. Juveniles are buff or gray above, barred with black chevrons, and have a mottled forehead and crown, black eye-to-nape patch, and black bill and legs. The Roseate's vocal array includes a high-pitched *chi-vik* advertising call, and musical *kliu* and raspy *aaach* alarm calls, the latter sometimes likened to the sound of tearing cloth.

### Distribution and Abundance

There have been 23 occurrences of breeding-season Roseate Tern documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). Prior to 1870, its status was somewhat obscure, but the Roseate was considered to be an abundant breeder within Common Tern colonies on Nantucket and Muskeget Islands, MA. Prior to the 20<sup>th</sup> century, eggging was a problem in northeast colonies, but it was persecution of terns for the plume industry that greatly reduced numbers in the northeast to perhaps 2,000 pairs, mostly at Muskeget and Penikese Islands, MA, by the 1880s. Following protection, numbers rose to the 8,500 pair level in 1930. From the 1930s through the 1970s, Roseates were displaced from nesting colonies by Herring and Great Black-backed Gulls, and had declined to 2,500 pairs by 1979. Currently, the northeast population hovers at about 4,300 pairs (1,697 in MA in 2001). Approximately 75% are dangerously concentrated at just 3 colonies: Great Gull Island, NY (1,500 pairs); Bird Island, Marion, MA (1,062 pairs); and Ram Island, Mattapoisett, MA (626 pairs). The only other nesting colonies in Massachusetts in 2001 were at Nauset - New Island, Orleans (3 pairs) and South Monomoy Island. (6 pairs).





**Massachusetts Towns with Recent Occurrences of Roseate Tern**

### **Habitat Description**

In Massachusetts, the Roseate Tern generally nests on sandy, gravelly, or rocky islands and, less commonly, in small numbers at the ends of long barrier beaches. Compared to the Common Tern, it selects nest sites with denser vegetation, such as seaside goldenrod and beach pea, which is also used for cover by chicks. Large boulders are used for cover at other locations in the northeast. It feeds in highly specialized situations over shallow sandbars, shoals, inlets or schools of predatory fish, which drive smaller prey to the surface. Unlike the Common Tern, the Roseate rarely feeds very close to shore, and in Massachusetts, it is known to forage up to 30 km from the breeding colony.

### **Threats**

Desertion of more than 30 major breeding sites over the past 80 years in most cases has been related to occupation of sites by gulls, and secondarily, to predation in the colonies (which may have intensified as terns were displaced by gulls to sites closer to the mainland). While populations in the state receive protection during the breeding season, the species is unprotected by South American governmental entities and while in international waters. Prior to the 1980s, persecution by humans (trapping for food) on the wintering grounds may have affected Roseates nesting in the northeast. Further investigation of current threats on the wintering grounds is necessary.

### **Reference**

Massachusetts Natural Heritage & Endangered Species Program. In prep. Roseate Tern (*Sterna dougallii*) Fact Sheet.

## Common Tern (*Sterna hirundo*, State Special Concern)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Salt Marshes, Coastal Dunes/Beaches/ Small Islands, Marine & Estuarine Habitats	State List; NE F&W Agencies

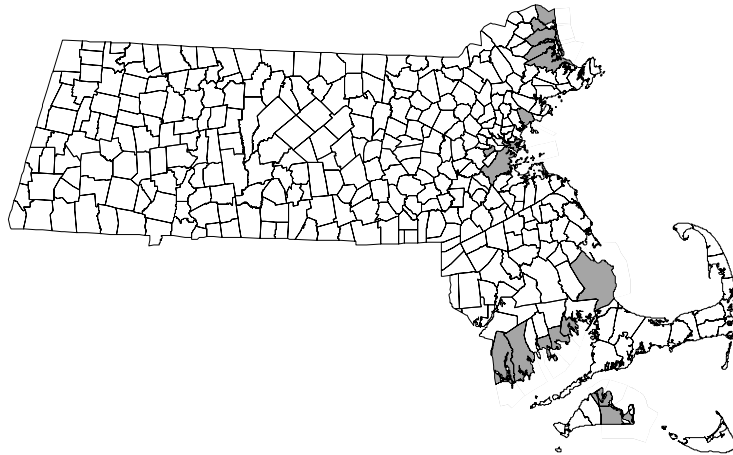
### Species Description

The Common Tern is a small, ground-nesting seabird that returns in the spring from warmer locales to enliven Massachusetts beaches with its raucous cries. It is a gregarious and charismatic creature, joining its neighbors to boldly mob, peck, and defecate on any intruders that enter its breeding colonies. Probably numbering in the hundreds of thousands in the state before 1870, the Common Tern is considerably scarcer today. Protection, management, and restoration of nesting colonies have allowed populations to gradually increase, but the Common Tern remains a Species of Special Concern in Massachusetts.

The Common Tern measures 13-16 inches in length. Breeding adults have light gray upperparts, paler gray underparts, a white rump, a black cap, orange legs and feet, and a black-tipped orange bill. The tail is deeply forked and mostly white, and does not extend past the tips of the folded wings. In non-breeding adults, the forehead, lores, and underparts become white, the bill becomes mostly or entirely black, the legs turn a dark reddish-black, and a dark bar becomes evident on lesser wing coverts. Downy hatchlings are dark-spotted buff above and white below with a mostly pink bill and legs. Juveniles are variable: they have a pale forehead, dark brown crown and ear coverts, buff-tipped feathers on grayish upperparts (resulting in a scaly appearance), white underparts, pinkish or orangish legs, and a dark bill. The voice has a sharp, “irritable” timbre, and includes a *keeri* advertising call and *kee-arrrr* alarm call.

### Distribution and Abundance

There have been 61 occurrences of breeding-season Common Tern documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). Populations are well below levels reported pre-1870, when hundreds of thousands are reported to have bred. Eggings probably limited populations throughout the 1700s and 1800s. More seriously, hundreds of thousands were killed along the Atlantic coast by plume-hunters in the 1870s and 1880s, reducing the population to a few thousand at fewer than ten known sites by the 1890s. In Massachusetts, only 5,000 to 10,000 pairs survived, almost exclusively at Penikese and Muskeget Islands. The state’s population grew to 30,000 pairs by 1920 following protection of the birds in the early part of the century. Populations subsequently declined through the 1970s, reaching a low of perhaps 7,000 pairs, largely as a result of displacement of terns from nesting colonies by Herring Gulls and, later, by Great Black-backed Gulls. Since then, numbers have edged upwards. In 2001, 14,378 pairs nested in the state. Over 80% of these birds were concentrated at just three sites: South Monomoy Island, Chatham (7,807 pairs); Bird Island, Marion (2,136 pairs); and Ram Island, Mattapoisett (1,890 pairs).



**Massachusetts Towns with Recent Occurrences of Common Tern**

### **Habitat Description**

In Massachusetts, the Common Tern generally nests on sandy or gravelly islands and barrier beaches, but also occurs on rocky or cobbly beaches and salt marshes. It prefers areas with scattered vegetation, which is used for cover by chicks. Along the Atlantic coast in the breeding area, it usually feeds within 1 km of shore, often in bays, tidal inlets, or between islands; it may forage as far as 20 km from the breeding colony.

### **Threats**

Populations in Massachusetts continue to be threatened by predators and displacement by gulls. Also, should established nesting colonies be disrupted, lack of suitable (*i.e.*, predator-free) alternative nesting sites is a serious concern in the state. Most colonies are protected by posting of signs, by presence of wardens, and/or by exclusion of visitors. Lethal gull control (initially), continual gull harassment, and predator control at South Monomoy and Ram Islands have resulted in thriving tern colonies at these restored sites. Two other tern restoration projects are currently underway, both involving clearing gulls from small portions of islands. At Penikese Island, in Buzzards Bay, after a pilot project in 1995, aggressive discouragement of gulls (using harassment by trained dogs and human site occupation) was initiated in 1998. The colony increased from 137 pairs of Common Terns in 1998 to 278 pairs in 2001. Non-lethal gull control at Muskeget Island, in Nantucket Sound, began in 2000, and in 2001, 68 pairs nested. Tern restoration is an on-going commitment that requires annual follow-up to prevent gulls from encroaching on colonies and to remove predators. While populations in the state are relatively well-protected during the breeding season, trapping of birds for food on the wintering grounds may be a source of mortality for Common Terns.

### **Reference**

Massachusetts Natural Heritage & Endangered Species Program. In prep. Common Tern (*Sterna hirundo*) Fact Sheet.

## Arctic Tern (*Sterna paradisaea*, State Special Concern)

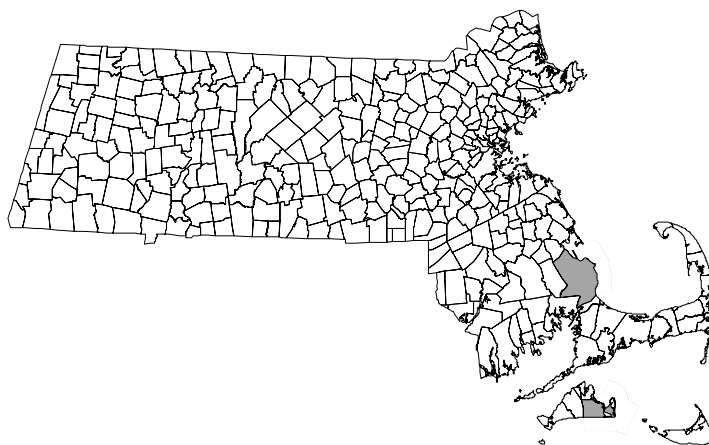
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Salt Marshes, Coastal Dunes/Beaches/ Small Islands, Marine & Estuarine Habitats	State List

### Species Description

The adult Arctic Tern is a small bird, 14-17 inches in length and 3-4 ounces in weight. It has a white body with a gray back, a black-capped head, a blood-red bill, and a deeply forked tail. It has a wingspread of 29-33 inches. Its most distinguishing features are its short red legs and a long tail which extends to the end of its folded wings. Its small feet and short legs make it appear to be crouching on the ground when it is actually standing. Juveniles have a short black bill, white forehead, short legs, and a sooty colored area from the eye to the nape of the neck. The Arctic Tern has a high-pitched, squeaky call of *kee-kee*, *kip*, *kip*, *kip-TEE-ar*, and a short *kee-kahr*.

### Distribution and Abundance

There have been 13 occurrences of breeding-season Arctic Tern documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). Records of this species have been inconsistent in the past due to the difficulty of identifying this bird and distinguishing it from the Common Tern. However, it is generally believed that in Massachusetts, the Arctic Tern was very rare in the late 1800s and required a longer period of time to recover from the deleterious effects of the millinery trade than Common or Least Terns. In 1937 and 1938, 60 pairs of Arctic Terns were reported from Cape Cod, 280 pairs were found in 1946 and 1947, and between 1968 and 1972, 110 pairs were reported. Since the apparent peak in population numbers during the late 1940s, the Arctic Tern has experienced a noticeable decline. In 2003, only 5 pairs were recorded nesting in the state.



Massachusetts Towns with Recent Occurrences of Arctic Tern

### Habitat Description

The Arctic Tern is found on sandy gravelly areas on islands and barrier spits. Occasionally, it occurs on mainland shores.

### Threats

It is not known precisely what has caused the decline in Arctic Terns since legal protection was instituted in the early 1900s prohibiting plume taking. As Massachusetts is at the southern edge of the species' breeding range, it is possible that the Arctic Tern will always occur in limited numbers in the state. However, predation and human disturbance have had a considerable impact on this species' reproductive success, and undoubtedly account in part for the significant decline in numbers since the late 1940s. Avian, insect, and mammalian predation on eggs and chicks has occurred at all sites currently known to support nesting Arctic Terns. Predators such as the Great Black-

backed and Laughing Gulls, Great Horned and Short-eared Owls, skunks, rats, and ants have destroyed eggs and chicks at nesting sites. Calamities such as unusually high tides may also contribute to egg and chick mortality. As for all terns in Massachusetts, oil spills can have a major deleterious impact on nesting colonies and adult birds.

**Reference**

Massachusetts Natural Heritage & Endangered Species Program. In prep. Arctic Tern (*Sterna paradisaea*) Fact Sheet.

## Least Tern (*Sterna antillarum*, State Special Concern)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S3	Salt Marshes, Coastal Dunes/Beaches/ Small Islands, Marine & Estuarine Habitats	State List; NE F&W Agencies

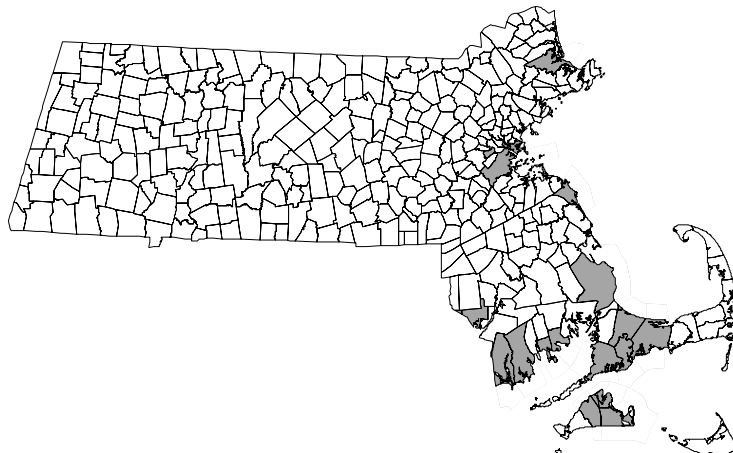
### Species Description

Diminutive yet feisty, the Least Tern is a spring and summer colonial nester on Massachusetts' sandy beaches. For nesting, it favors sites with little or no vegetation. This preference coincides with humans' most desired spots for recreation and development, resulting in conflicts of use and loss of considerable Least Tern habitat in the past century. Currently, the Least Tern is considered a Species of Special Concern in Massachusetts, and continued management of nesting habitat and colonies is necessary to protect the state's population.

The Least Tern measures just 9 inches in length and weighs only 2-3 ounces. In breeding plumage, the adult has a black cap and eyestripe, white forehead, pale gray upperparts, white underparts, a black-tipped, yellow-orange bill, and yellow-orange legs. Outside the breeding season, the crown and eyestripe become flecked with white, a dark bar forms on the wing, and the bill and legs darken. Hatchlings are tan or buff speckled with black. Juveniles are brown and buff on the back; pale feather edgings give them a scaly appearance. Underparts are white, the crown is buff speckled with black, and the eyestripe and nape are blackish. The Least Tern's voice is high and shrill. Its repertoire includes *zwreep* and *kit-kit-kit-kit* alarm calls, a *k'ee-you-hud-dut* recognition call, and the male's *ki-dik* contact call.

### Distribution and Abundance

There have been 92 occurrences of breeding-season Least Tern documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). The Least Tern suffered the same fate as Massachusetts' larger terns at the end of the 19<sup>th</sup> century – they were slaughtered for use as decorations for hats. By the early 20<sup>th</sup> century, only about 250 pairs of Least Terns remained in the state. Following legal protection, numbers increased to the 1,500 pair level by the 1950s, but declined again (perhaps as a result of increased recreational use of beaches) to perhaps 900 pairs by the early 1970s. More aggressive protection of breeding colonies since then has contributed to a fairly steady increase in numbers. In 2001, 3,420 pairs nested in the state, a record high for the past 100 years. Currently nesting at 54 breeding sites, the Least Tern is Massachusetts' most widely distributed tern. The largest colonies in 2001 occurred at Dunbar Point, Barnstable (599 pairs); Tuckernuck Island, Nantucket (432); Sylvia State Beach, Oak Bluffs (370); and Dead Neck-Sampsons Island, Barnstable (257). Favored breeding sites remain in flux, however, due to the species' sensitivity to disturbance, and because of its preference for nesting on unvegetated beaches.



Massachusetts Towns with Recent Occurrences of Least Tern

## **Habitat Description**

In Massachusetts, the Least Tern nests on sandy or gravelly beaches periodically scoured by storm tides (resulting in sparse or no vegetation). It also takes advantage of dredge spoils. In other areas of the country, it nests on riverine sandbars, mudflats, and gravel roofs. Along the coast, the Least Tern forages in shallow-water habitats, including bays, lagoons, estuaries, river and creek mouths, tidal marshes, and ponds.

## **Threats**

Since the 1970s, most nesting sites have been fenced and posted with signs to discourage human intrusion into colonies. At many sites, Piping Plover and Least Tern management is integrated due to the similar nesting habitat requirements and threats shared by these two species. Because of the Least Tern's propensity for nesting on mainland and barrier beaches (in contrast to offshore islands), disturbance of colonies by humans and predators remains a chronic problem. The principal conservation challenge confronting wildlife managers in protecting Least Terns is to maintain adequate separation between people on the beaches and the nesting colonies to enable the birds to successfully reproduce. Humans (and their dogs) in close proximity to colonies may keep adult birds off their nests, contributing to chick and egg mortality due to temperature extremes; dogs also kill chicks. Off-road vehicles crush tern eggs and chicks and destroy habitat – ruts created by tires trap chicks, preventing normal movements and further exposing them to interactions with vehicles. Garbage left on the beaches by humans may attract predators to colonies and cause birds to shift to alternate breeding sites. Given the habitat that the Least Tern selects, intensive and ongoing management of colonies will always be necessary if this species is going to be adequately shielded from disturbance. Efforts to limit coastal development are also critical to protecting the viability of the state's population.

## **Reference**

Massachusetts Natural Heritage & Endangered Species Program. In prep. Least Tern (*Sterna antillarum*) Fact Sheet.

## Barn Owl (*Tyto alba*, State Special Concern)

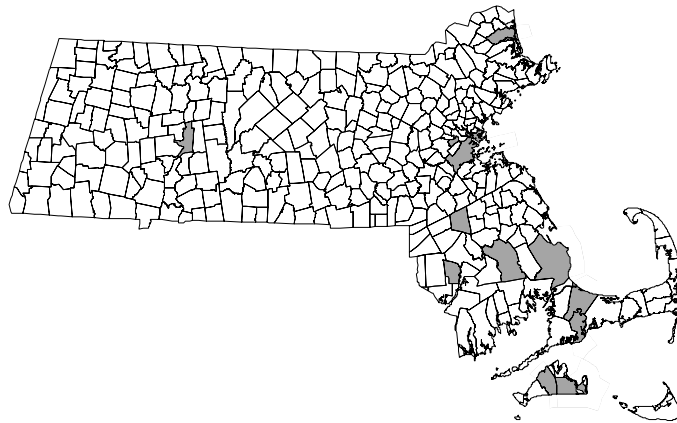
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Grasslands, Salt Marsh	State List

### Species Description

The Barn Owl is quite different in appearance from other owls owing to its distinctive heart-shaped face and dark eyes. Its large head lacks feathered ear tufts and its plumage is buff or light tan in color with brown specks on the upper portions. Females have a buff-colored breast lightly spotted with black; males have a white breast with fewer spots. The wings are long and rounded with ten primaries; the tail is short; the legs are long, sparsely feathered and equipped with powerful feet tipped with needle-sharp talons. This medium-sized owl is approximately 13-14 inches tall, with a wing span of 38-44 inches. Females are generally larger than males, weighing an average of 20 ounces to a male's 16 ounces.

### Distribution and Abundance

There have been 22 occurrences of breeding-season Barn Owl documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). In Massachusetts, this species is found mainly along the coastal plain from Newburyport south to Cape Cod and the surrounding islands. It also turns up occasionally in the Connecticut and Housatonic River Valleys. During this century, notable population expansion into the milder southeast coastal area of Massachusetts has occurred.



Massachusetts Towns with Recent Occurrences of Barn Owl

### Habitat Description

Barn Owls require grassy habitats for foraging, such as fresh and salt water marshes and agricultural fields. They rarely occur apart from populations of the Meadow Vole (*Microtus pennsylvanicus*), a primary food source, and avoid areas of deep snow and prolonged cold, which can preclude successful foraging. The Barn Owl is resourceful in making use of such nesting sites as hollow trees, cavities in cliffs or riverbanks, and artificial structures such as nest boxes, old barns, and bridges.

### Threats

Common threats to the Barn Owl include predation, starvation due to severe winter or drought, collisions with vehicles, and electrocution from power lines. Also, as inhabitants of farmsteads, Barn Owls are potentially exposed to a variety of insecticides and rodenticides. Humans have primarily affected Barn Owls through habitat destruction, illegal shooting, and nest disturbance. The fact that these birds have a weakly developed migratory pattern and will succumb to cold and starvation rather than migrate has contributed to their tenuous status in Massachusetts. Changes in agricultural practices are the most likely cause of population declines in the past 20 years. These changes have meant decreased availability of open farm structures for nesting and roosting, and a decline in agricultural lands that



support high densities of small mammals. Better grain storage and fewer grasslands constrict food sources for rodents, resulting in fewer prey for Barn Owls.

**Reference**

Massachusetts Natural Heritage & Endangered Species Program. 1995. Barn Owl (*Tyto alba*) Fact Sheet.

## Long-eared Owl (*Asio otus*, State Special Concern)

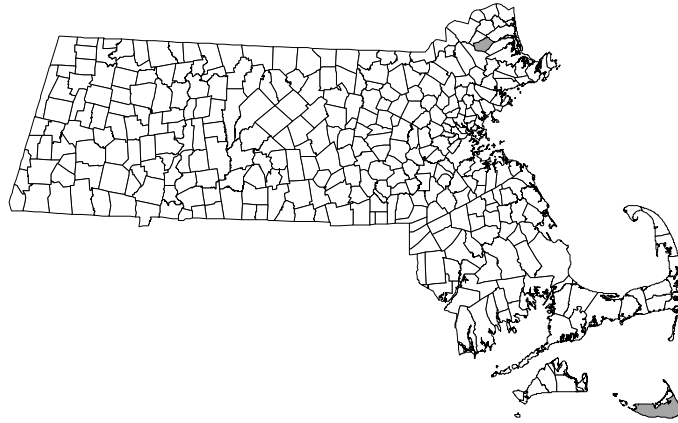
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Upland Forest, Pitch Pine/Scrub Oak	State List; NE F&W Agencies

### Species Description

The Long-eared Owl is a medium-sized woodland owl, smaller than either the Great Horned Owl or Barred Owl. Long-eared Owls are slender, with streaked and mottled white, buffy, brown and black bodies. The blackish upright ear tufts are conspicuous on top of the head. Female Long-eared Owls are larger than the males.

### Distribution and Abundance

There have been two occurrences of breeding-season Long-eared Owl documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). The last reported nesting in the state was in 1985.



Massachusetts Towns with Recent Occurrences of Long-eared Owl

### Habitat Description

Long-eared Owls inhabit dense woodlands (either coniferous or deciduous, or mixed woods) adjacent to more open areas, where they hunt.

### Threats

Massachusetts is at the southern edge of the breeding range for the Long-eared Owl. Likely current threats to this species in Massachusetts include conversion of hunting fields to development or closed-canopy forest; destruction of nesting sites by development; loss of nesting cavities to other species or due to logging of large trees. Eggs may be preyed on by raccoons; nestlings and adults may be taken by other raptors.

### Reference

Connecticut Department of Environmental Protection, Wildlife Division. 1992. Long-eared Owl (*Asio otus*) Fact Sheet.

## Short-eared Owl (*Asio flammeus*, State Endangered)

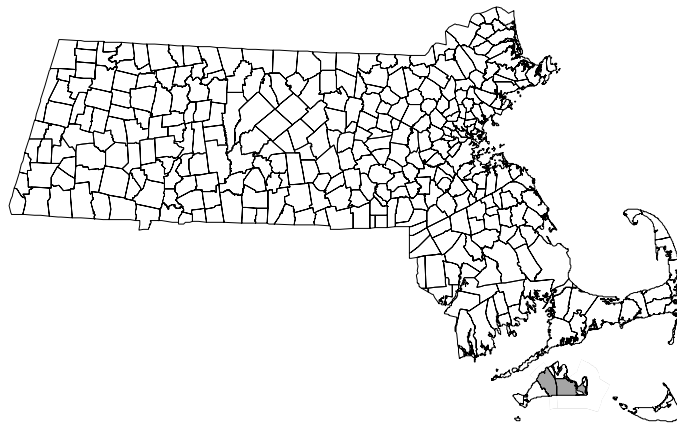
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Grasslands, Salt Marsh	State List; NE F&W Agencies; PIF Tier I

### Species Description

The Short-eared Owl is a crow-sized bird, approximately 13-17 inches long, with a wingspan of 38-44 inches. Its plumage is buff-colored; the back is predominantly brownish and contrasts with the lighter head; the underside displays long brown streaks. The Short-eared Owl has a white facial disk, with a black patch surrounding each yellow eye. The wings and tail are long and rounded, and the wings are longer than the tail. The undersurface of each wing is marked with a dark band near the bend of the wing and on the wingtip as well. The Short-eared Owl has very small ear tufts, which are usually very difficult to observe. The legs are feathered to the feet. Females are generally larger than the males, and darker in coloration.

### Distribution and Abundance

There have been 14 occurrences of breeding-season Short-eared Owl documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Short-eared Owl

### Habitat Description

Short-eared Owls in Massachusetts reside in large, undeveloped expanses of coastal sandplain grassland and maritime heathland -- habitats which are now almost as endangered as the owl itself. The vegetation of these habitats is comprised of clumped patches of shrubs (bayberry, huckleberry, blueberry, wild rose, dewberry, pitch pine and scrub oak) mixed with herbaceous vegetation consisting of sedges, forbs, and grasses (goldenrod, beachgrass, wild indigo, little bluestem). The Short-eared Owl nests on the ground, usually near or within herbaceous vegetation or low shrubs under 1.6 ft. (0.5 m) in height. The territory of a single breeding pair may encompass over 100 acres.

### Threats

The greatest threat to the Short-eared Owl is the loss of its habitat. The large, open, undisturbed areas where the Short-eared Owls breed are under enormous development pressure and must be conserved and managed to maintain viable populations of this species in Massachusetts.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1990. Short-eared Owl (*Asio flammeus*) Fact Sheet.

## Sedge Wren (*Cistothorus platensis*, State Endangered)

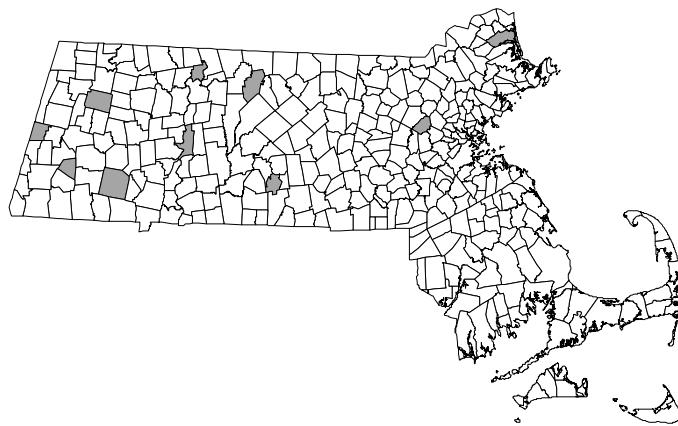
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Marshes & Wet Meadows	State List; NE F&W Agencies

### Species Description

The Sedge Wren is a small bird with a streaked brown back, a white-streaked crown, white and buffy underparts, and a short, cocked tail. The sexes are very similar in appearance.

### Distribution and Abundance

There have been ten occurrences of breeding-season Sedge Wren documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Sedge Wren

### Habitat Description

Sedge Wrens breed in sedge meadows, wet meadows, hayfields, and other open habitats with dense graminoid stands. They do not use cattail marshes.

### Threats

The primary threat to Sedge Wrens in Massachusetts is loss of breeding habitat due to the draining of wet meadow habitats, invasion by exotic plant species, frequent haying, frequent burning, or outright destruction of wetland habitats. Nests may be destroyed by haying, predators such as raccoons and skunks, or trampling by grazing cattle.

### Reference

Connecticut Department of Environmental Protection, Wildlife Division. 1993. Sedge Wren (*Cistothorus platensis*) Fact Sheet.

## Golden-winged Warbler (*Vermivora chrysoptera*, State Endangered)

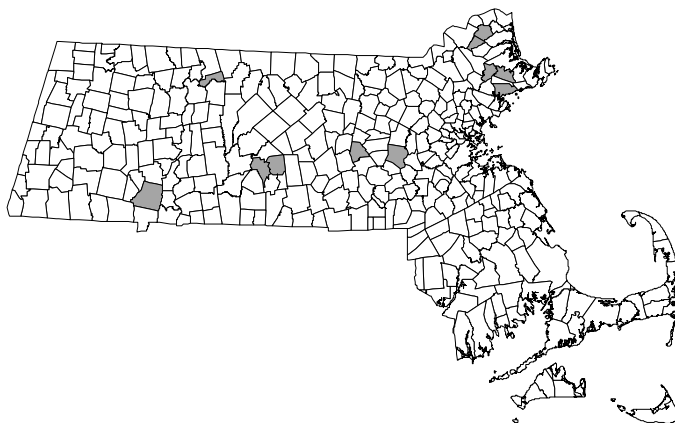
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1	Young Forests & Shrublands	State List; NE F&W Agencies

### Species Description

The Golden-winged Warbler is a beautiful bird, about 4.5 inches in length, with a distinctive combination of colors and patterns. The male has a dull white underside and a gray back, with bright yellow patches on the crown and upper wing surfaces, and a black throat and bill. A black “mask” extends across the eyes, with patches of white above and below the mask. The female Golden-winged Warbler is similar in appearance, but the colors are considerably duller. Male Golden-winged Warblers sing most persistently in the morning early in the nesting season. Golden-wings make use of two types of songs. One of the songs is characterized by a high-pitched buzzy phrase followed by 1 to 6 shorter buzzy phrases, and is used to attract mates. The other song consists of 3 to 5 low buzzy phrases ending with a higher buzzy phrase, and is used to defend the bird’s territory against other males.

### Distribution and Abundance

There have been 13 occurrences of breeding-season Golden-winged Warbler documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Golden-winged Warbler

### Habitat Description

Golden-winged Warblers prefer woodland edges bordering early successional clearings (such as abandoned farmland and powerline areas) heavily overgrown with patches of grass, weeds, bushes, shrubs, briars, and small trees. Common species of vegetation found in these habitats are grapevine (*Vitis* spp.), goldenrod (*Solidago* spp.), and birch (*Betula* spp.).

### Threats

There is no longer a viable population of Golden-winged Warblers anywhere in Massachusetts. In the 19th century, Golden-winged Warblers were rarely seen in New England. In the early 1900s, the population of Golden-winged Warblers in New England increased as many farmlands were abandoned. From then until 1940, Golden-winged Warblers were locally uncommon to common in Massachusetts, and Blue-winged Warblers were not present. Since 1940, Blue-winged Warblers increased steadily in numbers throughout the state, and have become common in many areas. At the same time, the number of Golden-winged Warblers has steadily declined to the point where they are now rare throughout Massachusetts, and completely absent over most areas. It appears that the Blue-winged Warblers may have been swamping the gene pool of the Golden-winged Warblers by interbreeding with them. The courtship calls and displays of each species are very similar. As a result, Golden-winged Warblers often mate with

Blue-winged Warblers, creating hybrids instead of true Golden-wings. However, Blue-winged Warblers also seem to be declining after reaching a zenith in the early 1980s.

Cowbird parasitism and loss or impairment of wintering habitat may also be part of the problem, but no one really understands exactly what happened to the Golden-wing; it is possible that the situation could reverse itself someday. The amount of suitable habitat for the Golden-wing does not seem to be a limiting factor; there is plenty of habitat available, but no birds to occupy it; many of the sites where Golden-winged Warblers have been seen since 1980 now appear to be abandoned. The only Golden-wings currently observed in Massachusetts are stray males which establish a territory in suitable habitat, advertise (usually without success, since there are no Golden-wing females around) and depart southward in autumn. The male, if still alive, will return to the exact same territory the following spring and try again. After the male dies (in 2 to 3 years), the habitat is again vacant. The likelihood of another male turning up in the same place is extremely small; usually the next pioneering male will pick somewhere else, and the discouraging cycle will repeat itself. Lately, so few Golden-wings turn up in Massachusetts that one can no longer expect to see them anywhere without a lot of luck.

## **Reference**

Massachusetts Natural Heritage & Endangered Species Program. 1990. Golden-winged Warbler (*Vermivora chrysoptera*) Fact Sheet.

## Northern Parula (*Parula americana*, State Threatened)

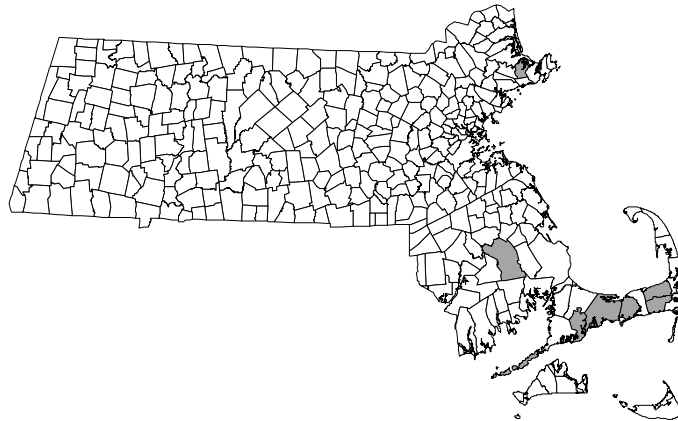
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Upland Forest, Forested Swamps, Riparian Forest	State List

### Species Description

The Northern Parula is one of the smallest and most distinctly marked of the North American wood warblers. They are 4¼-4 ¾ inches in length with a wing spread of 7-7 ¾ inches. The males are bright blue-grey above and white below, with an olive patch on the upper back and two bold white wing bars. They have a white eye ring broken by a black eye line, and a bright yellow throat with a dusky, red-brown chest band. Females and juveniles are similar but paler, and have little or no throat band.

### Distribution and Abundance

There have been ten occurrences of breeding-season Northern Parula documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Northern Parula

### Habitat Description

The Northern Parula is characteristically found in wet woodlands, such as Red Maple (*Acer rubrum*) or Atlantic White Cedar (*Chamaecyparis thyoides*) swamps, river margins, pond shores, or even small depressions. It usually nests in association with the moss-like lichen, Old-Man's Beard (*Usnea* spp.).

### Threats

Reasons for the decline in Northern Parula populations in Massachusetts and elsewhere in the northeast remain unknown. The decline coincides with the decline of its favored nesting material, *Usnea*, which may be sensitive to air pollution and acid rain. It is not clear to what degree the Northern Parula decline is associated with their dependence on *Usnea*. Additionally, its wintering grounds have experienced considerable destruction through deforestation and development, which may be a significant factor in the decline of this species.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1994. Northern Parula (*Parula americana*) Fact Sheet.

## Blackpoll Warbler (*Dendroica striata*, State Special Concern)

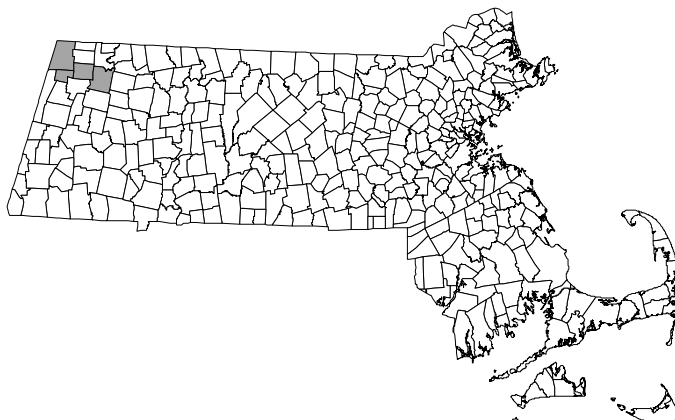
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Upland Forest	State List

### Species Description

The breeding male Blackpoll Warbler is a striped smoky-grey with a solid-black cap, white cheeks, and a white throat. It is streaked black above and white below, with black streaks running from the chin along its sides almost to its tail. It has two white wing bars, and white spots on the outer two or three tail feathers. The females are less heavily streaked, without the black crown patch or white cheeks; otherwise, they are marked much like the male on the back, wings and tail, but with an olive-green to gray body color and olive-yellow sides. The female also has a pale ring around the eye and a light streak above it. This warbler is 5-5 3/4 inches in length with a wingspan of 8-9 3/4 inches. The female is smaller than the male.

### Distribution and Abundance

There have been three occurrences of breeding-season Blackpoll Warbler documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Blackpoll Warbler

### Habitat Description

The Blackpoll Warbler is limited in Massachusetts by the lack of its preferred habitat – stunted spruce-fir forest. Near the summit of Mt. Greylock in northern Berkshire County, breeding Blackpoll Warblers are found in patches of stunted balsam fir (*Abies balsamea*). The breeding sites are conifers of medium to small size. The occurrence of very young or stunted balsam firs, cool woods, and filtered light seem to be a prerequisite for attracting the Blackpolls.

### Threats

The greatest potential impact on the future of the Blackpoll Warbler as a breeding species in Massachusetts is a change in its present breeding habitat: stunted balsam fir (*Abies balsamea*). Any manipulation of the breeding grounds is certain to bring about a decline in the number of nesting Blackpolls and possibly result in extirpation of the species from the state. It should also be noted that recent studies have shown that this habitat is sensitive to the effects of acid rain. Though the state must make every effort to insure the continued existence of suitable breeding habitat, ultimately, the future of the Blackpoll Warbler in Massachusetts may depend upon political decisions made at the national and international level regarding the protection of its wintering grounds, as well as the effects of acid rain within its breeding range.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1994. Blackpoll Warbler (*Dendroica striata*) Fact Sheet.



## Mourning Warbler (*Oporornis philadelphia*, State Special Concern)

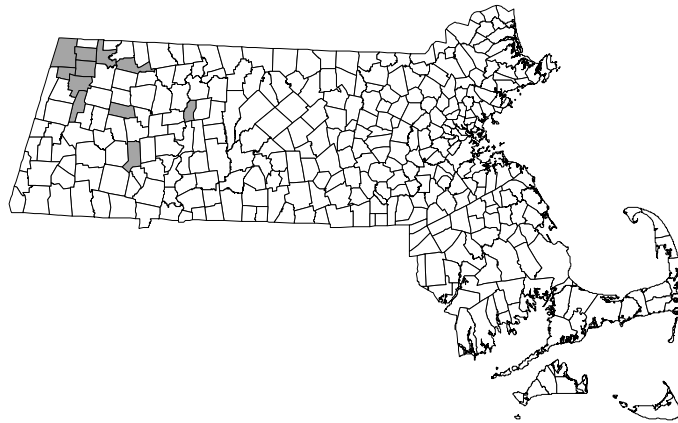
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Young Forests & Shrublands	State List

### Species Description

Mourning Warblers are small birds with olive-gray backs, a gray hood on the head and throat, and yellow underparts. The sexes are dimorphic: females have a lighter gray hood than males, and lack the black feathers on the chest which are a prominent feature on the males.

### Distribution and Abundance

There have been ten occurrences of breeding-season Mourning Warbler documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). Northwestern Massachusetts is on the edge of Mourning Warbler range, with most of the species' breeding range to the north and west.



Massachusetts Towns with Recent Occurrences of Mourning Warbler

### Habitat Description

Breeding Mourning Warblers prefer disturbed, second-growth areas, such as clearcuts a few years after logging. Areas with scattered woody shrubs and young trees seem to be preferred to those that are entirely open or with closed canopies.

### Threats

Mourning Warblers in Massachusetts are threatened by succession of their breeding habitat to closed-canopy forests, and by destruction of their habitat through development.

### Reference

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Vesper Sparrow (*Pooecetes gramineus*, State Threatened)

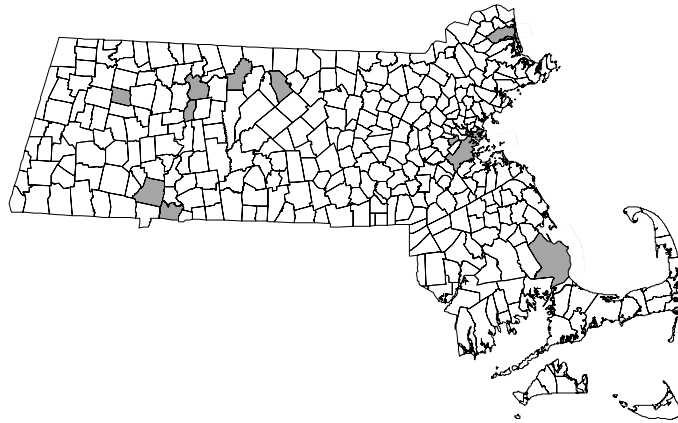
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Grasslands, Pitch Pine/Scrub Oak	State List

### Species Description

Vesper Sparrows are ground-dwelling birds, with streaks of black on gray-brown upperparts and whitish undersides. The outside tail feathers are white, contrasting with the darker, inner tail feathers.

### Distribution and Abundance

There have been 15 occurrences of breeding-season Vesper Sparrow documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Vesper Sparrow

### Habitat Description

Vesper Sparrows breed on the ground in sparsely vegetated, dry grasslands. Often, these areas have bare mineral soil or lichen-covered soil with scattered clumping grasses and forbs. These grasslands may be hayfields, airports, reclaimed sand pits, and the occasional natural field maintained by burning or as a frost pocket.

### Threats

Conversion of sparse grasslands to developed areas and (much less frequently) to row crops is the major threat to Vesper Sparrows in Massachusetts. Eggs and nestlings are subject to predation by raccoons, skunks and foxes. Frequent haying may also destroy nests or kill fledglings.

### References

Massachusetts Natural Heritage & Endangered Species Program. No date. Vesper Sparrow (*Pooecetes gramineus*) Fact Sheet.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Grasshopper Sparrow (*Ammodramus savannarum*, State Threatened)

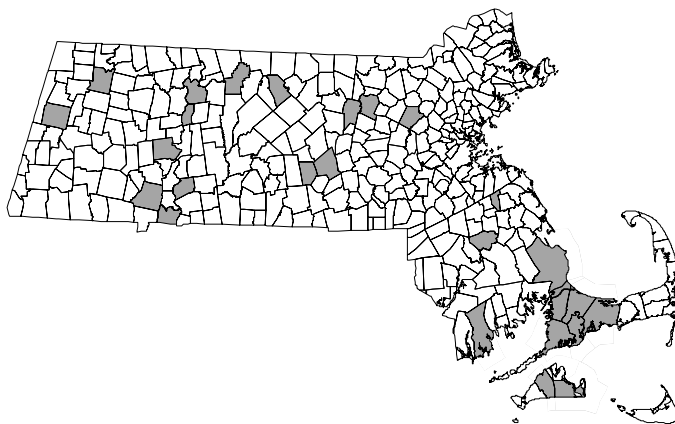
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Grasslands	State List

### Species Description

The Grasshopper Sparrow is a small sparrow of open fields. It is 4.5-5.5 inches long, has a flat head which slopes directly into the bill, and has a short, narrow tail. Each feather of the tail tapers to a point, giving it a ragged appearance. The upperparts have reddish streaks which contrast with the intervening gray. The dark brown crown is divided by a thin cream-colored center stripe. A yellowish spot extends from the bill in front of and below the eye. The sexes are similar. The typical song, often mistaken for the song of a grasshopper, consists of two chip notes followed by *tsk tsick tsurrrr*. Breeding birds also sing a complicated song with many squeaky and buzzy notes intermixed in a long phrase.

### Distribution and Abundance

There have been 32 occurrences of breeding-season Grasshopper Sparrow documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Grasshopper Sparrow

### Habitat Description

The Grasshopper Sparrow is found in sandplain grasslands, pastures, hayfields and airfields characterized by clumping grass species (rather than sod-forming grasses). It is also found on open knolls, on sandplains within pine barrens, and in coastal heathlands. It requires a patchy grassland habitat with bare ground and bunch grasses such as poverty grass (*Danthonia spicata*), bluestem (*Andropogon* spp.) and fescue (*Festuca* spp). Preferred habitat is characterized by relatively low stem densities and limited accumulation of ground litter. This species is generally absent from fields with over 35% cover in shrubs. Bare ground is especially important, as Grasshopper Sparrows behave much like field mice in their habit of running along the ground to escape predators and to forage for invertebrates.

### Threats

Loss of appropriate habitat to land development, changes in agricultural practices (early harvesting and fewer fallow fields), and natural succession appear to be the primary factors in this species' decline. Openings created by forest fires once provided habitat, but these are now rare.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1986. Grasshopper Sparrow (*Ammodramus savannarum*) Fact Sheet.

## Henslow's Sparrow (*Ammodramus henslowii*, State Endangered)

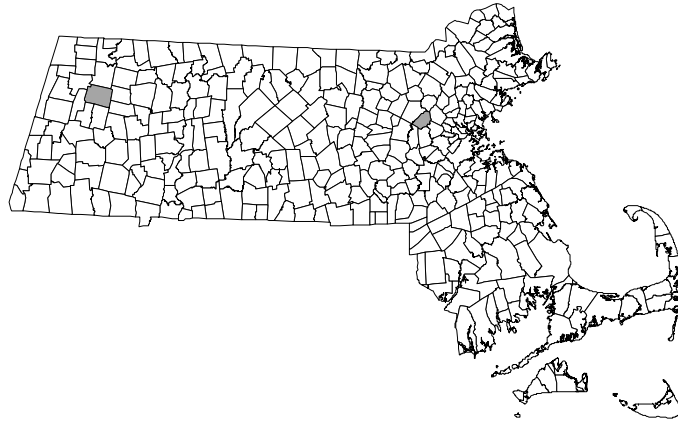
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1	Marshes & Wet Meadows, Grasslands	State List; NE F&W Agencies; PIF Tier I

### Species Description

The Henslow's Sparrow is a small (4.5 inches long) bird. Its dull olive-green head contrasts with a reddish-brown back and a necklace of dark streaks on the breast. This sparrow is usually found low in the grass and relies on running rather than flying. Its song is an insect-like *tslick*, perhaps the poorest vocal effort of any of the songbirds.

### Distribution and Abundance

There have been two occurrences of breeding-season Henslow's Sparrow documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Henslow's Sparrow

### Habitat Description

The Henslow's Sparrow inhabits open fields where vegetation is comprised of a dense growth of grass, weeds, or clover. Some scattered shrubs may be present, but extensive shrubby growth makes fields unsuitable. Wet meadows are most often the preferred habitat, although drier areas may be selected. The nests are constructed of woven grass on the ground, usually in a grass clump.

### Threats

The decline of this species is largely due to habitat destruction through wetland drainage and loss of open grassland habitat to urbanization or forest succession.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. No date. Henslow's Sparrow (*Ammodramus henslowii*) Fact Sheet.

## Saltmarsh Sharp-tailed Sparrow (*Ammodramus caudacutus*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S3	Salt Marsh	NE F&W Agencies; PIF Tier I

### Species Description

A marsh sparrow with a sharp tail, streaked breast, and buffy-yellow facial pattern surrounding a gray ear patch, the Saltmarsh Sharp-tailed Sparrow is 5 to 6 inches in length. Its primary vocalization is a buzzing hiss, preceded or followed by several sharp notes: *tuptup-sheeeeeee*.

### Distribution and Abundance

Breeding Saltmarsh Sharp-tailed Sparrows in Massachusetts are restricted to coastal salt marshes, where they may be locally abundant. The Massachusetts Breeding Bird Atlas Project (1974-79) confirmed breeding in 26 of 989 (2.3%) survey blocks and reported probable breeding in 11 blocks (1.0%) and possible breeding in 11 blocks (1.0%). Fall migrants occur in coastal salt marshes and, occasionally, inland freshwater marshes from late summer through October. The Saltmarsh Sharp-tailed Sparrow winters in coastal salt marshes from southern Massachusetts to Florida. NHESP does not track occurrences of Saltmarsh Sharp-tailed Sparrows in Massachusetts.

### Habitat Description

The Saltmarsh Sharp-tailed Sparrow inhabits coastal salt marshes dominated by saltwater cordgrass (*Spartina alterniflora*) and saltmarsh hay (*S. patens*). Most nests occur on or near the ground, just above high tide levels, and in salt marsh hay in the upper (i.e., drier) areas of salt marsh.

### Threats

Any activities that would destroy, fragment, or otherwise degrade salt marsh habitat, including dredging, ditching, filling, diking, or oil spills, may be threats to Saltmarsh Sharp-tailed Sparrows. High tide flooding and predation are the two primary factors affecting reproductive success.

### References

Greenlaw, G.S., and J. D. Rising. 1994. Sharp-tailed Sparrow (*Ammodramus caudacutus*). In *The Birds of North America*, No. 112 (A. Poole and F. Gill, eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Petersen, W.R., and W.R. Meservey. 2003. *Massachusetts Breeding Bird Atlas*. Massachusetts Audubon Society and University of Massachusetts Press, Amherst, Massachusetts.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Seaside Sparrow (*Ammodramus maritimus*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S2	Salt Marsh	PIF Tier I

### Species Description

This is a dark, olive-gray sparrow, 6 inches in length, with a sharp tail and a small yellow patch in front of the eye. Its song is *cut-cut-zhe'*-eeeeee, similar to Saltmarsh Sharp-tailed Sparrow, but with a stronger accented *zhe* in the middle.

### Distribution and Abundance

Seaside Sparrows are near the northern limit of their breeding range in Massachusetts. The species is rare and very locally distributed in salt marshes in the vicinity of Plum Island and Parker River in Essex County, at Sandy Neck and Monomoy on Cape Cod, and at South Dartmouth in Bristol County. It winters in salt marshes from North Carolina to southern Florida. NHESP does not track occurrences of Seaside Sparrows in Massachusetts.

### Habitat Description

Nesting occurs in salt marshes, on or near the ground, and just above high tide levels. The birds nest in both high and low salt marsh, the former dominated by saltmarsh hay (*Spartina patens*), black grass (*Juncus gerardii*), and scattered marsh elder (*Iva frutescens*); the latter dominated by saltwater cordgrass (*S. alterniflora*). Seaside Sparrows are more likely to nest in lower, *S. alterniflora*-dominated sections of marsh than are Saltmarsh Sharp-tailed Sparrows. Nests are susceptible to flooding from especially high tides. This species seems to be limited to a subset of the largest and least degraded salt marshes in Massachusetts, suggesting that it may be sensitive to the size of wetland area or some other landscape features in its selection of salt marsh habitat.

### Threats

This species is at risk in Massachusetts because of its rarity, limited distribution, and narrow habitat niche. Modification or degradation of its salt marsh habitat -- for example, by dredging and filling, ditching, diking, invasion by exotic vegetation, spraying of insecticides, oil spills, or long-term effects of sea level rise -- could threaten local populations.

### References

Petersen, W.R., and W.R. Meservey. 2003. *Massachusetts Breeding Bird Atlas*. Massachusetts Audubon Society and University of Massachusetts Press, Amherst, Massachusetts.

Post, W., and J. S. Greenlaw. 1994. Seaside Sparrow (*Ammodramus maritimus*). In *The Birds of North America*, No. 127 (A. Poole and F. Gill, eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.:The American Ornithologists' Union.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## American Black Duck (*Anas rubripes*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S4	Marine & Estuarine Habitats, Shrub Swamps, Forested Swamps, Lakes & Ponds, Salt Marsh, Marshes & Wet Meadows	At Risk Breeding Species; Management Concern

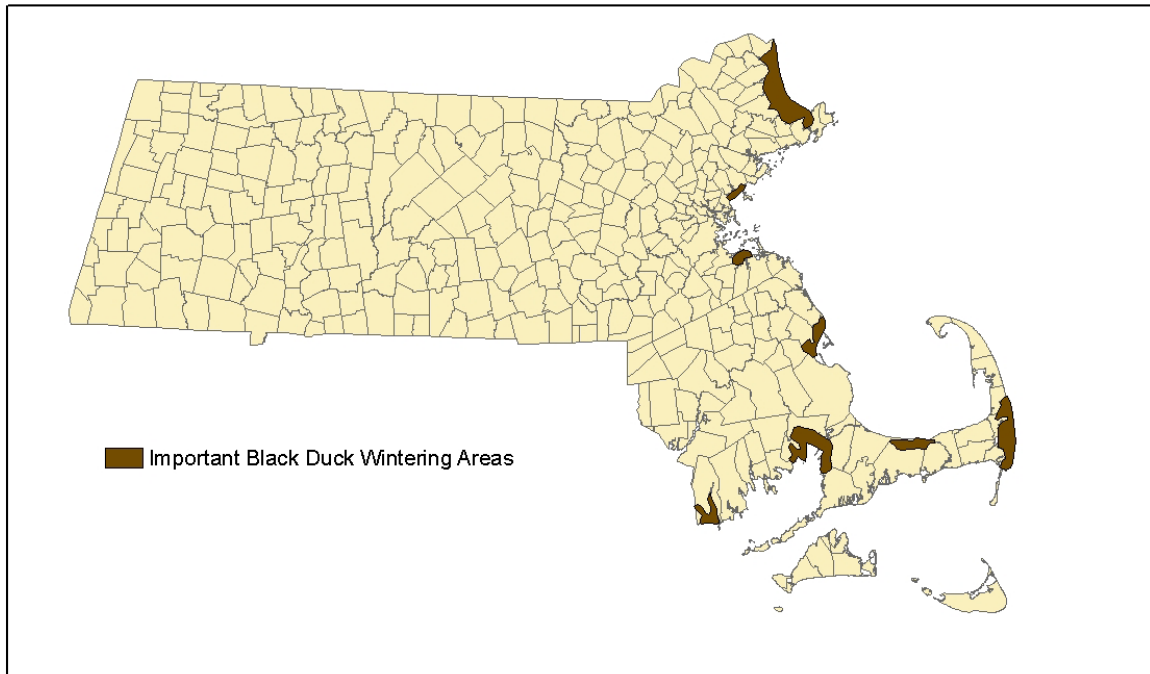
### Species Description

American Black Ducks are moderate-size ducks, differing from most ducks in that the sexes are monomorphic with only slight differences in bill and leg color. Both sexes are dark brown with slightly lighter-colored heads, and have white underwings. The males range from 21 to 24 inches in total length, and weigh between 2.5 and 3.4 pounds. Adult females are slightly smaller.

### Distribution and Abundance

American Black Ducks were formerly much more common as a nesting species in Massachusetts than they currently are. This decline as a breeding species has occurred throughout the Northeast and the reasons behind it are unclear. Breeding Bird Atlas surveys conducted in the 1970s revealed that Black Ducks nested throughout Massachusetts, but more recent Northeastern States Breeding Waterfowl surveys indicate that Black Ducks breeding inland are rare, averaging fewer than 0.20 pairs/km<sup>2</sup>. Densities on Cape Cod were slightly higher, falling in the 0.20-0.49 pairs/km<sup>2</sup> category. The highest densities were on salt marsh habitat where they exceeded 0.90 pairs/km<sup>2</sup>. The decline in breeding Black Ducks in the Northeast correlates with an increase in Mallard (*Anas platyrhynchos*) populations. Mallards are genetically closely related to Black Ducks and the two species are completely inter-fertile. Hybrids were commonly observed in the 1970s and 1980s, but have become less common as fewer Black Ducks are available for cross-breeding. Whether the Mallard is displacing the Black Duck or merely occupying habitat vacated by Black Ducks is uncertain. Mallards appear to be more tolerant of human disturbance and development than Black Ducks.

As a wintering species, Black Ducks have remained common along coastal Massachusetts, with little evidence of an overall decline over the past 50 years (though flocks in certain areas have diminished). In 2003, 1,600 Black Ducks wintered on sites, primarily inland, where they were fed by people, along with 15,000 mallards. There were 22,000 Black Ducks counted along the coast during the annual Midwinter Waterfowl Survey of that year.



### Habitat Description

Black Ducks utilize a variety of habitats. Breeding habitat tends to be forested wetlands, though formerly they were commonly found along major rivers and associated marshlands, from wet meadow to deep marsh, as well. Some black ducks also nest in salt marsh areas, but because of tidal conditions, the chances of successfully achieving a successful hatch between astronomical high tides are low. Most Black Ducks winter along coastal salt marsh and bay areas in Massachusetts. Both salt marsh and mussel flats are important sources of winter food, as they allow feeding across the full range of tidal fluctuation.

### Threats

The reasons behind the Black Duck's decline in the Northeast remain unclear. Loss of habitat, competition from Mallards, increased human development, over-hunting, acid deposition effects on invertebrate food supplies, and other reasons have been offered. In Massachusetts, the large decline in the number of waterfowl hunters and resulting decline in harvest makes hunting pressure an unlikely culprit. Certainly, increased development and urban sprawl have altered the habitat. Even the recent increase in beaver populations and resultant wetlands (which, in theory, should provide excellent Black Duck habitat) appears unable to reverse the trend of declining breeding populations. More subtle climatic changes may also be involved in the Black Duck's status, as breeding populations in Canada appear to be increasing.

### References

- Bellrose, F. C. 1976. *Ducks, Geese and Swans of North America*. 2nd ed. Stackpole Books, Harrisburg, Pennsylvania.
- Heusmann, H W and J. R. Sauer. 2000. The northeastern states' waterfowl breeding population survey. *Wildlife Soc. Bull.* 28(2):355-364.
- Petersen, W.R., and W.R. Meservey. 2003. *Massachusetts Breeding Bird Atlas*. Massachusetts Audubon Society and University of Massachusetts Press, Amherst, Massachusetts.



## Ruddy Turnstone (*Arenaria interpres*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	SNA	Coastal Dunes/ Beaches/ Small Islands	Shorebird Plan

### Species Description

A squat, medium-sized member of the plover family, the Ruddy Turnstone is 8 to 10 inches in length. The breeding plumage is a harlequin pattern of russet on the back and a unique black and white pattern on the face and breast. The legs are orange. Young birds and winter adults are duller, but retain enough of the basic pattern to be recognized.

### Distribution and Abundance

In Massachusetts, the Ruddy Turnstone is a locally abundant migrant and is locally uncommon in winter along coastal shorelines. Migration concentration areas in Massachusetts include the Monomoy islands and South Beach in Chatham, and the mouth of the North River in Scituate. The Ruddy Turnstone nests in northern Canada and winters coastally from Massachusetts to South America. NHESP does not track occurrences of Ruddy Turnstones in Massachusetts.

### Habitat Description

In Massachusetts, migrant and wintering Ruddy Turnstones inhabit sand, gravel, or cobble coastal beaches and intertidal areas.

### Threats

Disturbance caused by human recreational activities (pedestrians, off-road vehicles, dogs) and oil spills are threats to Ruddy Turnstones in Massachusetts.

### References

Nettleship, D. N. 2000. Ruddy Turnstone (*Arenaria interpres*). In *The Birds of North America*, No. 537 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Ruffed Grouse (*Bonasa umbellus*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Young Forests & Shrublands	Management Concern

### Species Description

The Ruffed Grouse is a medium-sized grouse, weighing 450 to 750 g. Males are slightly heavier than females. Coloration is cryptic with upperparts that are most commonly mottled rusty-brown with buff and black barring. Red or gray color phases can also occur. Underparts are barred with dark brown and buff fading toward the belly. A narrow buff-colored band runs from the lores to just behind the eye. The head has a long crest of blotchy brownish gray feathers that can be erected and on each side of the neck is a tuft of long black or brownish feathers that can be erected into an umbrella-like ruff. The rounded tail is reddish-brown or gray and has broad pale bands separated by narrow black bands and barring and a prominent dark subterminal band. Females generally have an incomplete subterminal band. The rump feathers of males have two whitish dots. In general, females are similar to males, but have a shorter crest and one whitish dot on the tail and rump feathers.

### Distribution and Abundance

Ruffed Grouse are fairly common in wooded areas throughout Massachusetts, but scarcer on Cape Cod and absent from Nantucket and Suffolk Counties. They were introduced to Martha's Vineyard, Dukes County, in the 1960's but their current status is uncertain. Populations were likely highest between the late 1800's and the mid-1940's when the Massachusetts landscape provided a mix of fields and early-successional forest. As the forests of Massachusetts matured, grouse numbers declined. Grouse numbers fluctuate from year to year and appear to be cyclical in abundance.

### Habitat Description

Ruffed Grouse occupy a variety of different habitats in Massachusetts. They prefer early-successional mixed deciduous-coniferous forest, but inhabit mature deciduous mixed forest in the western part of the state and scrub oak forest on Cape Cod. Drumming logs are important for male breeding displays. Early-successional hardwood forest with high stem densities and good visibility at ground level is important for male drumming sites.

### Threats

Ruffed Grouse in Massachusetts and throughout the Northeast have been declining due to loss of suitable habitat to forest succession and development. Large-scale regional management is required to provide a mix of early-seral and mid-seral forests throughout Massachusetts. Weather conditions and food resources affect survival and recruitment. Predation is a major cause of mortality and may affect grouse population numbers, but definitive information is lacking.

## Broad-winged Hawk (*Buteo platypterus*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Shrub Swamps, Forested Swamps, Young Forests & Shrublands, Upland Forest	BBS Decline

### Species Description

The Broad-winged Hawk is a small, forest-dwelling buteo ranging from 14 to 19 inches in length. Both sexes have similar plumages, but females are slightly larger and heavier. Two color morphs occur; the light morph is most common in Massachusetts. The adult has a brown back, cinnamon or chestnut barring on the underparts, a whitish throat, and conspicuous black-and-white tail bands. The wings have a prominent black band along the trailing edge. Juvenal plumage is similar to that of an adult, but the underparts are white with brown streaks, and the upperparts are whiter throughout. The tail is buff-colored with narrow dark brown bands, and the wing undersurface has a dusky band along the trailing edge.

### Distribution and Abundance

Broad-winged Hawks are a fairly common breeder in Massachusetts, except they are rare on Cape Cod and absent from the Islands (Petersen and Meservey 2003). Broad-winged Hawks are especially visible during fall migration, when thousands pass through the state in mid-September. The North American Breeding Bird Survey indicates a declining Massachusetts population trend of -9.4% annually from 1966-2003 (Sauer et al. 2004). Migration surveys from 1990 to 1994 also detected a declining population trend in the Northeast (Goodrich et al. 1996).

### Habitat Description

Broad-winged Hawks occupy continuous hardwood and mixed conifer/hardwood forests with canopy openings, such as small clearings, lakes, ponds, or marshes (DeGraaf and Yamasaki 2001). They are generalist predators, catching amphibians, young birds, insects, and, especially, small mammals, by hunting from perches often located at the forest edge or in openings. Broad-winged Hawks construct nests in trees of many different species, but usually choose to nest in the most abundant locally available tree species (Goodrich et al 1996). Nests are built of twigs and sticks, usually at the main crotch of a deciduous tree, or on a platform of horizontal branches against the trunk of a conifer.

### Threats

Little is definitively known regarding the threats to Broad-winged Hawks in Massachusetts. Habitat fragmentation appears to be the primary threat; breeding habitat for this species apparently increased in the Northeast as a result of reforestation following agricultural abandonment, but it has been suggested that Broad-winged Hawks require large tracts of continuous forest with openings (Goodrich et al 1996). Pesticides have negatively impacted reproductive success in other buteos, but pesticide impacts on Broad-winged Hawks have not been studied. Broad-winged Hawks rely more heavily on amphibians than other buteos, suggesting that regional pollution could potentially impact the population, but again, this is unknown (Goodrich et al 1996). Research is needed to evaluate the importance of these potential threats and to identify others.

### References

- DeGraaf, R.M., and M. Yamasaki. 2001. *New England Wildlife*. University Press of New England, Hanover, New Hampshire.
- Goodrich, L.J., S.C. Crocoll, and S.E. Senner. 1996. Broad-winged Hawk (*Buteo platypterus*). In: *The Birds of North America*, No. 218 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.
- Petersen, W.R., and W.R. Meservey. 2003. *Massachusetts Breeding Bird Atlas*. Massachusetts Audubon Society and University of Massachusetts Press, Amherst, Massachusetts.
- Sauer, J.R., J.E. Hines, and J. Fallon. 2004. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2003*. Version 2004.1. USGS Patuxent Wildlife Research Center, Laurel, Maryland.

## Green Heron (*Butorides virescens*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S4	Shrub Swamps, Forested Swamps, Riparian Forest, Marshes & Wet Meadows	BBS Decline

### Species Description

The Green Heron is a small (16 to 22 inches in length) migratory wading bird with a short neck and legs relative to other herons (Davis and Kushlan 1994). Adults have a glossy greenish-black crest, cap, and back. Male and female plumages are similar, although females may be duller and lighter. Wings are black with a greenish cast; the neck is rufous. The legs are orange, and the bill is dark. Young birds are striped brownish on neck and below, and the back is brownish with buff spots.

### Distribution and Abundance

Green Herons are found throughout Massachusetts during the breeding season, but are uncommon (Petersen and Meservey 2003). The North American Breeding Bird Survey recorded a declining Massachusetts population trend of -7.3% annually from 1966 to 2003 (Sauer et al. 2004).

### Habitat Description

Green Herons breed primarily in inland and coastal wetland thickets. They usually build solitary nests in trees or shrubs near open water up to about 10m above ground (Davis and Kushlan 1994). They are opportunistic foragers, but their primary food source is fish, obtained by hunting in shallow (<10 cm) water (Davis and Kushlan 1994).

### Threats

Loss of wetland habitat is the primary threat to this species (Davis and Kushlan 1994, DeGraaf and Yamasaki 2001). Green Herons are susceptible to pesticide pollution which results in decreased hatching success (Davis and Kushlan 1994).

### References

- Davis, W.E., Jr., and J.A. Kushlan. 1994. Green Heron (*Butorides virescens*). In *The Birds of North America*, No. 129 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.
- DeGraaf, R.M., and M. Yamasaki. 2001. *New England Wildlife*. University Press of New England, Hanover, New Hampshire.
- Petersen, W.R. and W.R. Meservey. 2003. Massachusetts Breeding Bird Atlas. Massachusetts Audubon Society and University of Massachusetts Press, Amherst, MA, 434 pp.
- Sauer, J.R., J.E. Hines, and J. Fallon. 2004. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2003*. Version 2004.1. USGS Patuxent Wildlife Research Center, Laurel, Maryland.

## Sanderling (*Calidris alba*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	SNA	Coastal Dunes/ Beaches/ Small Islands	Shorebird Plan

### Species Description

The Sanderling is a relatively small (7 to 8 inches in length), active sandpiper of the outer beaches. Birds in spring are bright rusty about the head, back, and breast. Fall and winter birds are very pale, with pale gray back, white underparts, and black shoulder. Sanderlings have bold white wing stripes in both plumages.

### Distribution and Abundance

Sanderlings are a common migrants and common wintering birds in Massachusetts. The Monomoy islands and South Beach in Chatham support the largest numbers of migrating Sanderlings, although peak numbers have declined since the 1950s. This species breeds on the Arctic tundra and winters from Massachusetts to southern South America. NHESP does not track occurrences of Sanderlings in Massachusetts.

### Habitat Description

Sanderlings inhabit sandy coastal beaches, sandspits, and intertidal flats in Massachusetts. The birds run along the lower beach, feeding on marine invertebrates.

### Threats

Disturbance associated with human recreation on beaches, including off-road vehicle use and dog-walking; loss or degradation of sandy beach habitat caused by human development or construction of hard structures, such as seawalls, jetties, armored coastal banks; and oil spills are all threats to Sanderlings in Massachusetts.

### References

MacWhirter, B., P. Austin-Smith, Jr., and D. Kroodsma. 2002. Sanderling (*Calidris alba*). In *The Birds of North America*, No. 653 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Red Knot (*Calidris canutus*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Coastal Dunes/ Beaches/ Small Islands	NE F&W Agencies; Shorebird Plan

### Species Description

This is a stocky, medium-sized shorebird, 10 to 11 inches in length. During spring migration, it has a distinctive (but pale) robin-red breast. During return migration in late summer and fall, it is a dumpy-looking shorebird with a washed-out gray look. Calls include a low *knut*, also a low *tooit-wit* or *wah-quoit*.

### Distribution and Abundance

The Red Knot occurs in Massachusetts as a locally abundant spring and fall migrant, and occasionally also appears in winter. It is much more abundant in Massachusetts during fall migration (mid-July through September) than in spring (the second half of May and early June). Major fall stopover areas include Third Cliff in Scituate, Plymouth Beach, Duxbury Beach, Monomoy and South Beach in Chatham, and Nauset Marsh in Eastham. Red Knots breed in northern Canada. They winter primarily in South America, but some birds winter from Massachusetts to the Gulf of Mexico. NHESP does not track occurrences of Red Knots in Massachusetts.

### Habitat Description

Red Knots use sandy beaches and intertidal areas in Massachusetts. It is uncertain if spring migrants in Massachusetts seek out and feed on the eggs of Horseshoe Crabs, as occurs with the continentally significant concentrations of Red Knots along Delaware Bay beaches in southern New Jersey and eastern Delaware in May.

### Threats

Recent declines in Red Knots at Delaware Bay during spring migration are believed related to serious declines in populations of Horseshoe Crabs caused by over-harvesting. The extent to which declines in Horseshoe Crabs in Massachusetts have affected Red Knots is uncertain. Oil spills are also a threat to this species.

### References

Harrington, B. A. 2001. Red Knot (*Calidris canutus*). In *The Birds of North America*, No. 160 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Whip-poor-will (*Caprimulgus vociferus*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S4	Pitch Pine/Scrub Oak, Young Forests & Shrublands	NE F&W Agencies

### Species Description

A grayish-brown, ground-nesting, nocturnal bird, 9.5 inches in length, the Whip-poor-will has cryptic plumage colored and patterned like dead leaves. It has large eyes, a tiny bill surrounded by bristles, and very short legs. When flushed, it flits around on rounded wings like a giant brown moth (unlike the Common Nighthawk, with slender, pointed wings). The Whip-poor-will is most readily detected by its call, a tiresome repetition of its name *whip'-poor-weel'*, with the accent on the first and last syllables, most commonly given in late spring and summer for a couple of hours after sunset and again for 2 or 3 hours before dawn.

### Distribution and Abundance

The Whip-poor-will is widely distributed in Massachusetts, but uncommon and declining. It occurs most commonly in the woodlands of the southeastern coastal plain in Plymouth County and on the Cape and Islands. It has largely disappeared as a breeding bird from the Berkshires and the more developed areas of eastern Massachusetts. Declines in breeding populations are difficult to quantify; Whip-poor-wills are under-sampled by existing breeding bird surveys because of their nocturnal calling and cryptic behavior. The Whip-poor-will breeds from central Canada to southern United States and winters from the southern U.S. to Central America. NHESP does not track occurrences of Whip-poor-wills in Massachusetts.

### Habitat Description

In Massachusetts, the Whip-poor-will is found in dry oak and pine woodlands with occasional clearings, at lower elevations. It nests on the ground in leaf litter, and feeds on moths and other flying insects.

### Threats

The causes of the decline in Whip-poor-wills are poorly understood; it may be a combination of loss and fragmentation of scrubby woodlands, increased predation on eggs and young by mammalian predators (including cats), and road mortality.

### References

Cink, C. L. 2002. Whip-poor-will (*Caprimulgus vociferus*). In *The Birds of North America*, No. 620 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Petersen, W.R., and W.R. Meservey. 2003. *Massachusetts Breeding Bird Atlas*. Massachusetts Audubon Society and University of Massachusetts Press, Amherst, Massachusetts.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Long-tailed Duck (*Clangula hyemalis*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	SNRN	Marine & Estuarine Habitats, Rocky Coastlines	Wintering Concentration

### Species Description

The Long-tailed Duck, previously known as the Old Squaw, is a moderate-sized duck, differing from other ducks in that it has distinct winter and spring plumages as compared to the nuptial and eclipse plumages of other species. The males possess a long, attenuated tail in both plumages, while the females' tails are more "duck-like." Both sexes are more streamlined than other sea ducks. Males appear primarily white in their winter plumage, with a dark chest, back, wings and tail. The face is tan with darker cheeks and throat. The color pattern is almost reversed in the summer, with the white head and neck changing to the dark brown color of the chest, and the tan of the face changing to white. The white plumage on the back also changes to a lighter brown. The contrast between the two plumages in the female is not as pronounced. The hen has a white chest and belly in the winter plumage and a mostly white head with light brown throat, back and wings. In the summer, the brown darkens and the white face feathers are replaced by more shades of brown with smaller white patches. The males range from 19 to 22 inches in length and weigh about two pounds. Adult females range from about 15 to 17 inches in length and typically weigh less than two pounds.

### Distribution and Abundance

Long-tailed Ducks are found in Massachusetts only during the winter, and then only along the coast. A few birds may be seen anywhere on coastal waters, but the largest concentrations winter in Nantucket Sound. Huge flocks numbering in the tens of thousand roost in the sound overnight, then fly out to sea at dawn, returning at dusk. Because of this flight pattern, these ducks are not recorded on the annual Midwinter Waterfowl Survey conducted by the U.S. Fish and Wildlife Service. They are detected on Audubon's Christmas Bird Counts.

### Habitat Description

Long-tailed Ducks feed offshore during the winter months spent in Massachusetts. They feed primarily on animal matter, including crustaceans, fishes, and mollusks. They are among the deepest diving ducks, reaching depths of 100 meters. Offshore shoals are important feeding sites.

### Threats

The open ocean habitats utilized by Long-tailed Ducks have previously made them immune to the hazards of development. The proposed Cape Wind windmill complex sited in Nantucket Sound presents a potentially disrupting development. Preliminary studies suggest Long-tailed Ducks roost primarily outside the proposed wind park, but those observations are based on day-time surveys. Distribution at night may be different. Oil spills also present a threat as the birds are so concentrated at night. Disease outbreaks pose another hazard. Long-tailed Ducks were the primary victims of a disease outbreak in Maryland in the 1980s. Because of their tendency to dive deep for food, many Long-tailed Ducks have been killed when entrapped in commercial gill netting operations. The offshore habitat used by these ducks means scant hunting pressure is directed toward the species and only a few hundred are harvested each year in Massachusetts.

While no immediate monitoring or other actions are required at this time, tracking the diurnal activities of Long-tailed Ducks while wintering in Massachusetts, and determining the timing of their migration to and from Massachusetts coastal waters, is advised.

### Reference

Bellrose, F. C. 1976. *Ducks, Geese and Swans of North America*. 2nd ed. Stackpole Books, Harrisburg, Pennsylvania.



## Northern Bobwhite (*Colinus virginianus*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Pitch Pine/Scrub Oak, Grasslands, Young Forests & Shrublands	BBS Decline; Management Concern

### Species Description

The Northern Bobwhite is a small to medium-sized quail, averaging about 8 to 10 inches long. Males are slightly heavier than females. The tail is rounded and contains 12 retrices. Adult males have brown uppers, barred with tan and black, a white forehead and triangular patch on throat and chin. The breast, sides, and flanks are barred with black and some chestnut. Adult females are similar but with buff areas on the head instead of white.

### Distribution and Abundance

The Northern Bobwhite was once found throughout Massachusetts except for the northern tier of Berkshire, Franklin, and Worcester counties. It probably reached its peak of abundance during the extensive land clearing in the 1820s to 1840s. Severe winter storms between the 1870s and 1898 wiped out all quail between Cape Cod and New Hampshire. After another severe winter in 1903-04, the bird never fully recovered its former range. By the 1930s, however, it was reduced to the six southeastern counties and a coastal strip of Essex County. At present, quail breed regularly only in Barnstable, Bristol, Dukes, Nantucket, and Plymouth counties. Occasional reports elsewhere probably represent field trial survivors.

### Habitat Description

Northern Bobwhite require early successional habitats among a wide variety of vegetation types. These include small agricultural fields, grasslands, pastures, savannahs, and mixed areas of grass and brushlands. The best habitats include a mosaic of small patches of field, forest, and crop lands which are protected from habitat succession by grazing, burning, or active management. In the northern states, overhead woody cover is essential to restrict ground snow cover, allowing quail access to the ground for foraging.

### Threats

Northern Bobwhite have been declining at an alarming rate range-wide for 40 years. These losses are principally attributed to loss and alteration of early successional and grassland habitats at both the local and landscape level. Dramatic changes in land tenure and ownership bode poorly for the bobwhite. This bird benefits more from additional usable space than from increased quality of smaller habitats; thus, a shift from fine-scale management of local plots to large-scale regional management is required. Severe storms and other climatic events also affect bobwhite recruitment and survival. Predation also affects quail, but definitive information on this subject is lacking.

### References

- Brennan, L.A. 1999. Northern bobwhite (*Colinus virginianus*). In *The Birds of North America*, No. 397. (A. Poole and F. Gill, eds.) The Birds of North America, Inc., Philadelphia, Pa., 28pp.
- Guthery, F.S., M.J. Peterson, and R.R. George. 2000. Viability of northern bobwhite populations. *Journal of Wildlife Management* 64: 646-662.
- Williams, C.K., F.S. Guthery, R.D. Applegate, and M.J. Peterson. 2004. The northern bobwhite decline: scaling our management for the twenty-first century. *Wildlife Society Bulletin* 32: 861-869.

## Prairie Warbler (*Dendroica discolor*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Pitch Pine/Scrub Oak, Young Forests & Shrublands	PIF Tier I

### Species Description

The Prairie Warbler is a neo-tropical migrant of scrub oak-pitch pine barrens and areas of brushy secondary growth. It can be found breeding from the upper Gulf Coast north to the Ohio Valley and northeast into New England. Prairie Warblers winter in low scrub throughout the West Indies and south Florida. They eat mostly insects and spiders, but will also take mollusks and sometimes fruit. In Massachusetts, autumn migration begins in July, with birds returning to breeding grounds in late May.

### Distribution and Abundance

The Prairie Warbler occurs in every county in Massachusetts, with a major population concentration in the scrub oak-pitch pine barrens of Plymouth County. Elsewhere it is uncommon to fairly common in areas of dry secondary growth.

Breeding Bird survey data shows that the population of Prairie Warbler has experienced an overall decline of 2.0% from 1966 to 2002. Some of the most significant declines have occurred in the Ohio Hills region (4.5%) and in much of the species' southwestern range. Declines in other areas have resulted in the species being listed as state-endangered in Michigan, and the sub-species *d. paludicola* being listed as special concern in Florida. One region that has seen a significant increase to the population is northern New England (6.4%), although southern New England has decreased (3.1%), with Massachusetts populations declining by 1.06%.

The Prairie Warbler is considered a Tier I Conservation Priority by Partners In Flight, and is listed as a Watchlist Species by the National Audubon Society.

### Habitat Description

The Prairie Warbler nests in areas of brushy second growth, dry scrub, low pine-juniper, pine barrens, and burned-over areas. The species is not sensitive to patch size, and often is found breeding in dense shrub vegetation associated with regenerating clearcuts and powerline right-of-ways.

In Massachusetts, the Prairie Warbler is commonly found on the southeastern coastal plain in scrub oak and pitch pine barrens, especially those that are periodically burned. Away from the coastal plain it is found in disturbed areas with heavy secondary growth, such as clearings beneath high-tension lines, overgrown pastures, and near brushy gravel pits.

### Threats

The major threat to Prairie Warbler populations in Massachusetts is loss of suitable habitat due to landscape conversion and succession. This species is also a frequent host to the Brown-headed Cowbird. Although shrubland birds as a group do not appear to be as sensitive to patch-size as other groups of birds, the indirect affects of suburban sprawl can be important through the magnified risks on ground nests from predation (domestic cats, raccoons, etc.) and cowbird parasitism.

Management for the Prairie Warbler should seek to maintain habitat diversity in the region, specifically to increase the array of woody plant communities in mid-seral stages of secondary succession. Steps must also be taken to preserve blocks of pine barrens where major concentrations of the species persist. In pine barrens and oak scrub associations, fire is an important management tool. Prairie Warblers benefit from controlled burning, but the frequency of burns must be considered closely. Managing utility rights-of-way has enormous potential for increasing habitat availability for shrubland birds, and capitalizing on these already existing and essentially permanent shrublands should be encouraged whenever possible. In landscapes that are primarily forested, early successional forest patches should be included in rotational forest management where several small and several large

early successional patches are rotated through the forest matrix. Where suitable habitat currently exists, efforts should be made to protect the landscape from development.

## References

Askins, R. R. 2000. *Restoring North American Birds*. Yale University, New Haven, Connecticut.

Petersen, W.R., and W.R. Meservey. 2003. *Massachusetts Breeding Bird Atlas*. Massachusetts Audubon Society and University of Massachusetts Press, Amherst, Massachusetts.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2003*. Version 2004.1. USGS Patuxent Wildlife Research Center, Laurel, Maryland.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## **Snowy Egret (*Egretta thula*, no state or federal status)**

<b>Global Rarity Ranking</b>	<b>State Rarity Ranking</b>	<b>Habitats</b>	<b>Conservation Concern</b>
G5	S1	Salt Marsh, Coastal Dunes/Beaches/ Small Islands, Marine & Estuarine Habitats	Waterbird Plan

### **Species Description**

A medium -sized white heron, the Snowy Egret is 20 to 27 inches in length, with a slender black bill, black legs, and yellow feet. It has white plumes on the neck, back, and breast during breeding. The voice is a low croak.

### **Distribution and Abundance**

The Snow Egret was considered a rare vagrant from the south until the late 1940s. Its breeding range has expanded northward into Massachusetts during the last 50 years; the first reported nesting in Massachusetts was in 1955 in Dennis. Snowy Egrets nest colonially on coastal islands. The last comprehensive census in Massachusetts (1994-95) reported 608 nesting pairs at 10 colonies.

### **Habitat Description**

Snowy Egrets nest in mixed colonies with other species of egrets and herons. The nests are in trees or patches of shrubs on coastal islands, presumably to reduce the likelihood of mammalian predation. Snowy Egrets forage in marshes and ponds near their breeding colonies for small fish, snails, and aquatic invertebrates.

### **Threats**

Predation and human disturbance at nesting colonies are threats to Snowy Egrets in Massachusetts. Loss of nesting trees due to storm damage, physical deterioration caused by years of exposure to bird excrement, or human cutting and clearing may also be threats; these will certainly cause breeding populations to relocate.

### **References**

Parsons, K. C., and T. L. Master. 2000. Snowy Egret (*Egretta thula*). In *The Birds of North America*, No. 489 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Petersen, W.R., and W.R. Meservey. 2003. *Massachusetts Breeding Bird Atlas*. Massachusetts Audubon Society and University of Massachusetts Press, Amherst, Massachusetts.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Willow Flycatcher (*Empidonax traillii*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S4	Young Forests & Shrublands	PIF Tier I

### Species Description

The Willow Flycatcher, formerly considered conspecific with the Alder Flycatcher under the name Traill's Flycatcher, was recognized as a distinct species in 1973. Though the two species are nearly identical in appearance and have overlapping habitat preferences, they can be readily distinguished by vocalization and nesting biology, and hybridization has never been documented. The Willow Flycatcher is a somewhat widespread species that breeds in a variety of shrubby, often wet habitats from Maine to British Columbia, and as far south as Arizona. In winter it tends to seek out similar habitats from southern Mexico to northern South America. The Willow Flycatcher is a late spring migrant with a relatively short breeding season, typically oriented around a single brood.

### Distribution and Abundance

Willow Flycatchers are widespread and increasing as breeders in Massachusetts, particularly in lowland areas. They are especially numerous along such rivers as the Sudbury and Neponset, and at the periphery of extensive marshes, such as those in Lynnfield. Willow Flycatchers seem to be increasing in Massachusetts at the expense of the Alder Flycatcher, possibly due to subtle changes in habitat, but the exact relationship is not fully understood.

North American Breeding Bird Survey data, which lump Willow and Alder Flycatchers, indicate a survey-wide population decline of 0.1 percent annually between 1966 and 1996. During that period, the most dramatic declines have been in the western regions, at 1.2 percent annually. However, eastern populations have been relatively stable over that period, with the Massachusetts population increasing at 3.5 percent annually. Populations of the southwestern sub-species, *t. extimus*, have been extirpated throughout much of their former range and are now federally listed as endangered.

### Habitat Description

In general, the Willow Flycatcher prefers moist shrubby areas, often associated with standing or running water. Massachusetts birds are typically found in brushy thickets of willow and similar shrubs associated with swamps, wetlands, and riverbanks. There is some breeding habitat overlap in Massachusetts with the closely related Alder Flycatcher, though the Willow Flycatcher will often be found in more open areas of wetlands such as wet meadows, marshes and broad river floodplains.

### Threats

The main threat to Willow Flycatcher populations is the degradation of suitable nesting habitat. This is particularly prevalent in the western United States where the overgrazing of riparian areas and large-scale flood control projects have resulted in dramatic declines in regional populations. In Massachusetts, these threats have had a lesser impact on the local population, but changes to the hydrology or plant composition of breeding areas will have a negative impact upon breeding success. The spread of exotic, invasive wetland plants species is a growing threat to breeding habitat.

Willow Flycatchers will benefit from maintaining communities of deciduous shrubs in riparian areas and meadows, with patches of dense shrubs interspersed with openings, and with open water nearby. Where suitable breeding habitat currently exists, efforts should be made to protect the landscape from development and to proactively exclude exotic, invasive plant species. It should be noted that unoccupied sites are not necessarily unsuitable, as populations may be dynamic.

### References

Sauer, J. R., J. E. Hines, and J. Fallon. 2004. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2003*. Version 2004.1. USGS Patuxent Wildlife Research Center, Laurel, Maryland.

Sedgewick, J. A. 2000. Willow Flycatcher (*Empidonax traillii*). In *The Birds of North America*, No. 533 (A. Poole and F. Gill, eds.). The Bird of North America, Inc., Philadelphia, PA.

Petersen, W.R., and W.R. Meservey. 2003. *Massachusetts Breeding Bird Atlas*. Massachusetts Audubon Society and University of Massachusetts Press, Amherst, Massachusetts.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## American Kestrel (*Falco sparverius*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Grasslands, Young Forests & Shrublands	BBS Decline

### Species Description

The American Kestrel, formerly known as the Sparrow Hawk, is North America's smallest and most widespread falcon, occurring from Alaska to Canada's Maritime Provinces, and south through Central America. It inhabits open areas where it hunts from perches or hovers above the landscape, focusing on arthropods and small mammals on the ground, and occasionally capturing insects and small birds on the wing. The American Kestrel is a secondary cavity nester that readily accepts artificial nest boxes.

### Distribution and Abundance

The American Kestrel breeds in all regions of Massachusetts with open country, though specific breeding sites can be limited by suitable nesting cavities. The counties of eastern Massachusetts hold the state's highest Kestrel breeding densities, while the more heavily wooded Berkshire and Worcester Counties have the state's lowest densities.

Breeding Bird survey data shows that the population of the American Kestrel has experienced an overall decline of 0.5 percent annually from 1966 to 2002. Of the states with declines in Kestrels, Massachusetts ranks as having one of the sharpest declines during that timeframe, at 8.0 percent annually. As a whole, the southern New England states have experienced the most severe regional decline at an overall 10.7 percent annually. This late 20<sup>th</sup> century decline follows the probable population surge of the 18<sup>th</sup> and 19<sup>th</sup> centuries when large areas of eastern North America were deforested for agricultural purposes.

### Habitat Description:

The American Kestrel uses a variety of open to semi-open habitats, including meadows, grasslands, early oldfield successional communities, open parkland, and agricultural fields, as well as both urban and suburban areas. Regardless of vegetative composition, breeding territories are characterized by either large or small patches covered by short ground vegetation, with taller woody vegetation either sparsely interspersed upon the landscape or altogether absent. Suitable nest trees and perches are required for breeding territories, and with the introduction of nest boxes, previously unused but otherwise suitable habitat is now being occupied. Because of the relatively large territory size of the American Kestrel, there are few discrete sites that hold a significantly high percentage of the Massachusetts population.

### Threats:

The lack of suitable nesting cavities appears to be a limiting factor for this species in Massachusetts. Additionally, an overall decrease in suitable open habitat due to development or forest succession has reduced the presence and breeding success of the species in the state. American Kestrel has also been proven sensitive to pesticides and other toxins, resulting in documented cases of reduced reproductive success and direct adult mortality.

Perhaps the easiest way to improve American Kestrel habitat is to continue the placement of nest boxes in suitable landscapes. To encourage this, kestrel nest box plans and a natural history/conservation fact sheet can be posted on the DFW website. Also, a flyer can be developed and distributed, similar to DFW wood duck flyers that explain the most suitable locations and habitats for placing nest boxes. Additionally, the use of ecological management techniques such as mechanical vegetation removal or prescribed fire to promote and maintain open habitats should be encouraged. The creation and maintenance of suitable open habitats through the Landowner Incentive Program is one strategy that may be effective. Where suitable habitat currently exists, efforts should be made to protect the landscape from development.

## References

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2003*. Version 2004.1. USGS Patuxent Wildlife Research Center, Laurel, Maryland.

Smallwood, J. A., and D. M. Bird. 2002. American Kestrel (*Falco sparverius*). In *The Birds of North America*, No. 602 (A. Poole and F. Gill, eds.). Philadelphia, PA.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.



## American Oystercatcher (*Haematopus palliatus*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Coastal Dunes/ Beaches/ Small Islands, Salt Marsh	Shorebird Plan

### Species Description

A large (17-21 inches in length), thick-set shorebird, the American Oystercatcher has a black head and neck, a dark back, a white belly, large white patches on wings and tail, and a distinctive large, straight bill. A noisy bird, its vocalizations include a piercing *weep* and a loud *pic-pic-pic*.

### Distribution and Abundance

In Massachusetts, American Oystercatchers are rare but increasing in abundance and expanding in distribution along the coast. Although American Oystercatchers were first documented nesting in Massachusetts in 1969, their presence here is believed to be a re-occupation of former territory lost sometime after European colonization, rather than a new range extension. A statewide census in 2004 estimated 189 pairs at 58 sites in Massachusetts, with the largest numbers on Nantucket, Martha's Vineyard, Monomoy National Wildlife Refuge in Chatham, and the Boston Harbor Islands. Post-breeding concentrations of over 100 birds now occur annually in August on intertidal flats and beaches at the Monomoy islands and South Beach in Chatham.

### Habitat Description

The American Oystercatcher nests above the high tide line on the upper portions of sandy or gravelly beaches, at the edges of salt marshes or dunes, or on low ridges within salt marshes. It feeds nearby on lower portions of beaches, on intertidal flats, and at edges of salt marshes. Principal foods include oysters, mussels, clams, marine worms, crabs, and other marine invertebrates.

### Threats

Known threats in Massachusetts include mammalian and avian predation on eggs and chicks; and human-caused disturbance and mortality of egg or chicks caused by human recreational activities, off-road vehicles, and dogs. Oil spills are a potential threat.

### References

Nol, E., and R. C. Humphrey. 1994. American Oystercatcher (*Haematopus palliatus*). In *The Birds of North America*, No. 82 (A. Poole and F. Gill, eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Petersen, W.R., and W.R. Meservey. 2003. *Massachusetts Breeding Bird Atlas*. Massachusetts Audubon Society and University of Massachusetts Press, Amherst, Massachusetts.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Harlequin Duck (*Histrionicus histrionicus*, no state or federal status)

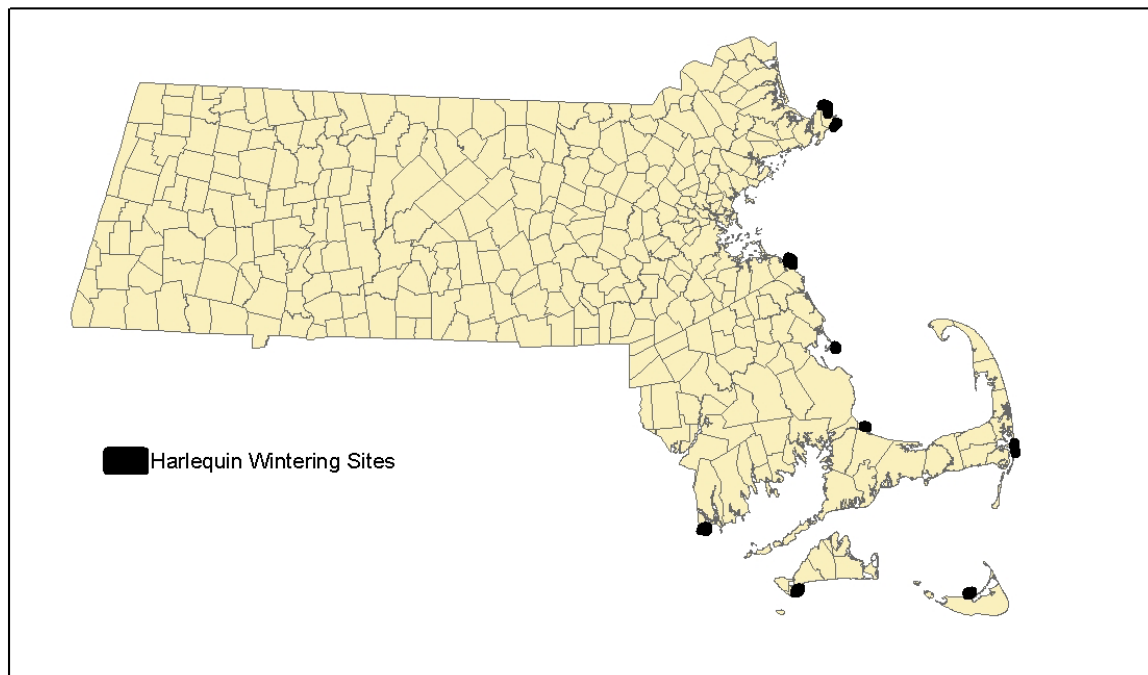
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	SNRN	Rocky Coastlines	NE F&W Agencies

### Species Description

Drake Harlequin Ducks are among the most unusually colored of all ducks. The basic body color is slate blue, but the head and body are covered with a series of white crescents and spots, offset by chestnut flanks and a chestnut stripe on either side of the head. Females are a nondescript brown with a whitish patch on the cheek and whitish spots in front of and behind the eye. From a distance, both sexes appear dark. Harlequins are small ducks. The males range from 1 to 21 inches in length and weigh 1.3 to 1.6 pounds. Adult females are slightly smaller.

### Distribution and Abundance

Harlequin Ducks are northern nesters with populations in western North America, eastern North America, Greenland and Iceland. In eastern North America, they breed in Quebec, with small numbers in Newfoundland and northern New Brunswick. Radio tagging has suggested some movement of Harlequins between eastern Canada and Greenland. Wintering is primarily in Maritime Canada south to Rhode Island, with some birds occurring on the Great Lakes. Concern over perceived declining numbers led to closure of the hunting season in the U.S. in 1989. In 1991, they were listed as an endangered species in Canada. Since then, more recent reviews of the literature suggest the decline was not as pronounced as originally thought, but poor record keeping during the early years of survey work make assessing population changes questionable. A recent increase in numbers may be attributed to better surveying and monitoring. There is scant evidence that the eastern race was ever abundant, likely due to their special habitat requirements. The eastern North American population likely numbers no more than a few thousand birds. In Massachusetts, Harlequins are found in small numbers along Cape Ann, Plymouth, and Martha's Vineyard with a state total of only a few hundred wintering birds.



**Habitat Description**

Harlequin Ducks use relatively specialized habitat, breeding along fast-flowing, sub-arctic rivers and streams and wintering on turbulent coastal marine habitat, especially along rocky shorelines. They feed in relatively shallow water, diving for food in water only 1 to 3 meters deep.

**Threats**

Threats to the eastern population come from loss of breeding habitat to hydroelectric power plant dams which inundate river breeding habitat. Mining and associated ship traffic near staging areas in Labrador and northeastern Quebec may also disrupt populations. In Massachusetts, disturbance on wintering sites may have a negative influence. The closure of the hunting season for this species should be retained.

**Reference**

Bellrose, F. C. 1976. *Ducks, Geese and Swans of North America*. 2nd ed. Stackpole Books, Harrisburg, Pennsylvania.

## Wood Thrush (*Hylocichla mustelina*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Upland Forest	PIF Tier I

### Species Description

The Wood Thrush is the largest woodland thrush in New England, known to many admirers for its flute-like song. It is a medium-sized (8 inches in length) migratory songbird, similar in posture to the American Robin but smaller in size (Roth et al. 1996). Male and female plumages are similar, and include a brown crown, nape, back, wings, and tail. The underparts are white with conspicuous black spots on the breast and sides. Adults have a white eye-ring and pinkish legs. Juvenile plumage is similar, but with tawny spots on the back and wing coverts.

### Distribution and Abundance

The Wood Thrush is a fairly common breeder across Massachusetts, but it is rare on Cape Cod and absent from Nantucket (Petersen and Meservey 2003). The North American Breeding Bird Survey indicates a declining population trend of -3.6% annually from 1966-2003 (Sauer et al. 2004).

### Habitat Description

Wood Thrush preferred habitat is mature, moist hardwood or mixed conifer/hardwood forest with a closed canopy and a sub-canopy shrub layer (DeGraaf and Yamasaki 2001). In early summer, this species forages in leaf litter or semi-bare ground by probing and gleaning for soil invertebrates. In late summer (following the nesting season), the diet shifts toward fruits (Roth et al. 1996). Nests are compact cups constructed in dense shrubs or other concealing vegetation, usually less than 6 meters from ground (Roth et al. 1996).

### Threats

Habitat loss and fragmentation is the primary threat to the Wood Thrush, both in Massachusetts and on its wintering grounds (DeGraaf and Yamasaki 2001, Roth et al. 1996). Although Wood Thrushes will nest in small woods and residential areas, it is area-sensitive, and habitat fragmentation may cause lower reproductive success due to the effects of nest parasitism, predation on eggs and nestlings, and nest abandonment caused by human disturbance (Roth et al. 1996).

### References

- DeGraaf, R.M., and M. Yamasaki. 2001. *New England Wildlife*. University Press of New England, Hanover, New Hampshire.
- Petersen, W.R., and W.R. Meservey. 2003. *Massachusetts Breeding Bird Atlas*. Massachusetts Audubon Society and University of Massachusetts Press, Amherst, Massachusetts.
- Roth, R.R., M.S. Johnson, and T.J. Underwood. 1996. Wood Thrush (*Hylocichla mustelina*). In: The Birds of North America, No. 246 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.
- Sauer, J.R., J.E. Hines, and J. Fallon. 2004. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2003*. Version 2004.1. USGS Patuxent Wildlife Research Center, Laurel, Maryland.

## Laughing Gull (*Larus atricilla*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Coastal Dunes/ Beaches/ Small Islands, Marine & Estuarine Habitats, Salt Marsh	At Risk Breeding Species

### Species Description

Small coastal gulls, Laughing Gulls are 16 to 17 inches in length. Adults in breeding plumage have a black head, dark gray back and wings, black wing tips, and white tail. The call is a strident laugh: *ha-ha-ha-ha-ha-haah-haah-haah*.

### Distribution and Abundance

Laughing Gulls occur along much of the Massachusetts coastline from April through November, but currently nest in a single colony on South Monomoy Island, Chatham, where 1,200 pairs nested in 2003. A former colony on New Island in Eastham was recently abandoned after natural processes of shoreline migration connected it to Nauset Spit, allowing access by mammalian predators. Numbers of breeding Laughing Gulls in Massachusetts have declined substantially over the past 60 years, down from over 20,000 pairs as recently as the early 1940s.

### Habitat Description

This gull nests colonially on sandy islands and the remote ends of sand spits. It forages along the shore and in coastal bays and inlets and channels of salt marshes, feeding on crustaceans, other invertebrates and small fish.

### Threats

Primary threats to Laughing Gulls are loss of secure nesting habitat because of competition from Greater Black-backed and Herring Gulls; mammalian predation; and oil spills. The continued presence of Laughing Gulls as a breeding species in Massachusetts is threatened by the species' declining abundance and increasingly limited number of nesting colonies in the state.

### References

Burger, J. 1996. Laughing Gull (*Larus atricilla*). In *The Birds of North America*, No. 225 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Petersen, W.R., and W.R. Meservey. 2003. *Massachusetts Breeding Bird Atlas*. Massachusetts Audubon Society and University of Massachusetts Press, Amherst, Massachusetts.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Short-billed Dowitcher (*Limnodromus griseus*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	SNA	Coastal Dunes/ Beaches/ Small Islands	Shorebird Plan

### Species Description

A medium-sized shorebird, the Short-billed Dowitcher is 10.5 to 12 inches in length, with a very long bill. It has a rusty breast in spring and summer, and a gray breast and back in fall. Short-billed Dowitchers feed with a "sewing machine" motion. Its voice is a staccato *tu-tu-tu*.

### Distribution and Abundance

Short-billed Dowitchers occur in Massachusetts as a migrant during both spring and late summer-early fall. It breeds in northern Canada and winters coastally from Virginia to Florida and the U.S. Gulf Coast, and southward to South America. NHESP does not track occurrences of Short-billed Dowitchers in Massachusetts.

### Habitat Description

Short-billed Dowitchers in Massachusetts occur primarily on extensive coastal mudflats and sandflats. Occasionally, a few birds occur at inland locations on mudflats in marshes or reservoirs.

### Threats

Short-billed Dowitcher habitat is relatively secure in Massachusetts, but it could be degraded by oil spills or loss of mudflats to dredging or coastal development. Human disturbance in feeding or roosting habitat may be a threat at some locations.

### References

Jehl, J. R., Jr., J. Klima, and R. E. Harris. 2001. Short-billed Dowitcher (*Limnodromus griseus*). In *The Birds of North America*, No. 564 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Petersen, W.R., and W.R. Meservey. 2003. *Massachusetts Breeding Bird Atlas*. Massachusetts Audubon Society and University of Massachusetts Press, Amherst, Massachusetts.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Eskimo Curlew (*Numenius borealis*, Federal Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
GH	SX	Coastal Dunes/ Beaches/ Small Islands	Federal List; Shorebird Plan

### Species Description

Eskimo Curlews are small, 12 to 14 inches long (smaller than the similar Whimbrel), with a thin, slightly decurved bill. The plumage is buff-colored interspersed with black; the undersides of the wings are cinnamon-buff. The call has been described as *tee-dee-dee* or a repeated *tee-dee*.

### Distribution and Abundance

The Eskimo Curlew is nearly extinct; its current rangewide status is uncertain. The continental population of Eskimo Curlew plummeted during the latter half of the 19th century, from apparently hundreds of thousands of birds to so few that now sightings are considered extremely rare. Formerly it nested on Arctic tundra and wintered in southern South America. Eskimo Curlews migrated north through the Great Plains in spring and occurred uncommonly along the Atlantic Coast in late summer and early fall, including on Nantucket. There have been no specimens collected and only one convincing sight record of this species in Massachusetts since 1913: a sight record from Martha's Vineyard in August, 1972.

### Habitat Description

The habitat during fall migration in Massachusetts includes coastal beaches, dunes, intertidal flats and salt marshes, as well as heathlands, fields, and pastures. The principal foods during southward migration are berries, especially of ericaceous plants, and insects.

### Threats

The precipitous decline of this species is not fully understood, but is likely due to some combination of over-shooting during the 19th and early 20th centuries, conversion of natural grasslands to agricultural areas along its spring migration route across the prairies of North America (and, later, the pampas of South America), and suppression of fire. This species' social nature (making it more susceptible to hunting mortality), relatively low reproductive potential, and reliance on specific habitat types may also have contributed to its decline. Occasional reports sustain hope that it may still survive.

### References

Gill, R. E., Jr., P. Canevari, and E. H. Iverson. 1998. Eskimo Curlew (*Numenius borealis*). In *The Birds of North America*, No. 347 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Whimbrel (*Numenius phaeopus*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	SNA	Coastal Dunes/ Beaches/ Small Islands	Shorebird Plan

### Species Description

Whimbrels are large, 15 to 19-inch, gray-brown shorebirds, with a long (2.75 to 4-inch) down-curved bill and striped crown. Its vocalization is 5 to 7 short rapid whistles: *ti-ti-ti-ti-ti*.

### Distribution and Abundance

Whimbrels occur in Massachusetts only during migration. They are uncommon in the spring and locally common during fall migration (late July through September), especially in the vicinity of the Monomoy islands and South Beach in Chatham. It breeds in subarctic regions of Canada and winters from Virginia south to Florida and the Gulf Coast and south to South America. NHESP does not track occurrences of Whimbrels in Massachusetts.

### Habitat Description

The habitats of Whimbrels in Massachusetts include coastal mudflats, sand flats, and salt marshes.

### Threats

Destruction or degradation of coastal wetlands, human disturbance during migration, and oil spills are all threats to this species. On wintering areas south of the United States, hunting and exposure to environmental contaminants (cadmium, for example) are also threats.

### References

Skeel, M. A., and E. P. Mallory. 1996. Whimbrel (*Numenius phaeopus*). In *The Birds of North America*, No. 219 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.



## Black-crowned Night-Heron (*Nycticorax nycticorax*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Salt Marsh, Coastal Dunes/Beaches/ Small Island	At Risk Breeding Species

### Species Description

A stocky, thick-billed, short-legged heron, Black-crowned Night-Herons ranged from 23 to 28 inches in length. When seen during the day, these herons are usually inactive, with a hunched posture. At dusk, Black-crowned Night-Herons fly to their feeding areas. Breeding birds have a blackish back and black cap, contrasting with light underparts, and two white head plumes. The voice is a flat *quok!*, most often heard at dusk.

### Distribution and Abundance

Black-crowned Night-Herons are widely distributed along the Massachusetts coast; 1,420 pairs were reported from 19 nesting colonies in 1994-95. Post-breeding assemblages of roosting or feeding birds sometimes occur in summer or early fall at locations widely separated from the nesting colonies. This species formerly nested in the Connecticut River Valley into the 1930s, but is now uncommon at locations more than 20 miles from the coast. Black-crowned Night-Herons have declined substantially as a breeding species in Massachusetts since the late 19th century.

### Habitat Description

Habitats of Black-crowned Night-Herons in Massachusetts include salt marshes and tidal flats, fresh and brackish marshes, ponds, and creeks. Night-Herons are primarily nocturnal and crepuscular foragers on small fish, amphibians, crabs and other crustaceans, and insects. Occasionally, they feed on the eggs and young of gulls and terns. These herons nest colonially in trees or shrubs, often in mixed-species assemblages with other herons. Often the vegetation used for nesting is eventually killed by years of accumulating excrement, forcing the herons to seek another colony site.

### Threats

Threats to this species include human disturbance at nesting colonies; destruction of woody vegetation used for nesting; and coastal development that degrades or destroys nesting, roosting or feeding habitat. Pesticides such as DDT are believed to have impaired reproductive success in the past.

### References

Davis, W. E., Jr. 1993. Black-crowned Night-Heron (*Nycticorax nycticorax*). In *The Birds of North America*, No. 74 (A. Poole and F. Gill, eds.). Philadelphia: The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D. C.

Petersen, W.R., and W.R. Meservey. 2003. *Massachusetts Breeding Bird Atlas*. Massachusetts Audubon Society and University of Massachusetts Press, Amherst, Massachusetts.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Eastern Towhee (*Pipilo erythrophthalmus*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Young Forests & Shrublands, Pitch Pine/ Scrub Oak	BBS Decline

### Species Description

The Eastern Towhee is a ground-foraging passerine associated with scrubland, brushy ecotones, and areas of early woody regeneration. It breeds throughout the eastern United States into southern Ontario, and is considered a short-distance migrant in the northern reaches of its range. The northern limit of its winter habitat is generally from the mid-Atlantic States west through Ohio, though annually some individuals will attempt to winter in southern New England. Typically, Eastern Towhee is a double-brooded species, building its nest on the ground or very low in dense tangles.

### Distribution and Abundance

The Eastern Towhee is distributed across the entirety of Massachusetts wherever suitable breeding habitat is found. The Eastern Towhee has declined steadily in recent decades in North America, and may be declining more rapidly than any other bird species in North America. Breeding Bird Survey results show that the population of Eastern Towhee has fallen in 18 states and in one Canadian province. The most severe drop in population was in New England, where the annual rate of decline between 1966 and 1989 ranged from 5.5-10.2 percent annually for different states.

Banding data for migrating birds at Manomet Bird Observatory (Manomet, MA) also indicate that the abundance of Towhees has dropped. In the spring of 1970 an average of 4.5 Towhees were captured for every day of banding, but by the spring of 1988 the average had dropped to less than one individual per day. This was the greatest reduction in abundance for any of the 52 species that are regularly banded at Manomet.

### Habitat Description

The Eastern Towhee is an edge-associated generalist that occupies varied mesic and xeric habitats characterized by dense shrub-small tree cover and a well-developed litter layer. This species occupies mid-to-late stages of secondary succession with the greatest densities occurring in open field thickets and later stages of second growth, but it is sometimes present in climax forest where the understory is well developed.

In Massachusetts, Eastern Towhees are most numerous in the scrub-oak and second-growth forests of Plymouth County, Cape Cod and the Islands. They particularly favor areas where moorland is succeeding to scrub-oak barrens; however, as the oaks mature, towhee numbers decline. Elsewhere the species is found throughout the state wherever there is secondary growth or forest openings.

### Threats

The major threat to Eastern Towhee populations in Massachusetts is loss of suitable habitat due to landscape conversion and succession. Though shrubland birds as a group do not appear to be as sensitive to patch-size as other groups of birds, the indirect affects of suburban sprawl can be important through the magnified risks on ground nests from predation (domestic cats, raccoons, jays) and cowbird parasitism.

Management for Eastern Towhee should seek to maintain habitat diversity in the region; specifically to increase the array of woody plant communities in midseral stages of secondary succession. Steps must also be taken to preserve blocks of pine barrens where major concentrations of the species persist. In pine barrens and oak scrub associations, fire is an important management tool. Towhees benefit from controlled burning, but the frequency of burns must be considered. Managing utility rights-of-way has enormous potential for increasing habitat availability for shrubland birds, and capitalizing on these already existing and essentially permanent shrublands should be encouraged whenever possible. In landscapes that are primarily forested, early successional forest patches should be included in rotational forest management where several small and several large early successional patches are rotated through

the forest matrix. Where suitable habitat currently exists, efforts should be made to protect the landscape from development.

## References

Askins, R. R. 2000. *Restoring North American Birds*. Yale University, New Haven, Connecticut.

Lanyon, W.E. 1995. Eastern Towhee (*Pipilo erythrophthalmus*). In *The Birds of North America*, No. 262 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2003*. Version 2004.1. USGS Patuxent Wildlife Research Center, Laurel, Maryland.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Sora (*Porzana carolina*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Marshes & Wet Meadows	Local Rarity & Decline

### Species Description

A small, plump, gray-brown rail (8 to 9.75 inches in length), the Sora has large feet, a short tail, and a short yellow bill. Adults have a distinctive black patch on the face and throat. Because of its secretive habits, this species is more often heard than seen. Calls include a loud descending whinny, a plaintive whistled *ker-wee*, and a sharp *keek*.

### Distribution and Abundance

The Sora is a rare breeding species in Massachusetts, nesting at widely scattered wetlands where suitable habitat occurs. A statewide survey of marsh birds during May, June, and early July in 1991-93 found Soras in only 30 of 177 wetlands surveyed, and estimated that most wetlands supported only 1 or 2 pairs. NHESP does not track occurrences of Soras in Massachusetts.

### Habitat Description

In Massachusetts, the Sora breeds primarily in freshwater marshes dominated by cattails with good interspersions of other emergent, floating-leaved, and submergent vegetation and open water. It is also found in wet meadows in late summer and early fall, and in salt marshes during migration. Soras are attracted to patches of wild rice in late summer and early fall.

### Threats

Loss and degradation of wetland habitats through draining, filling, siltation, invasion by exotic vegetation (such as purple loosestrife and *Phragmites*), and lowering of local water tables caused by water withdrawals associated with suburban development are all threats to this species. The effect of hunting on local breeding birds is uncertain, but may be minimal because of low hunting pressure and the influx of migrant Soras into the state in early fall.

### References

Melvin, S. M., and J. P. Gibbs. 1996. Sora (*Porzana carolina*). In *The Birds of North America*, No. 250 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Petersen, W.R., and W.R. Meservey. 2003. *Massachusetts Breeding Bird Atlas*. Massachusetts Audubon Society and University of Massachusetts Press, Amherst, Massachusetts.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## American Woodcock (*Scolopax minor*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S4	Grasslands, Young Forests & Shrublands, Shrub Swamps	Shorebird Plan; Management Concern

### Species Description

The American Woodcock is a compact bird weighing between 116 and 219 grams. On average, females are larger than males. Males and females are similar in appearance. The plumage is mottled with brown, buff, and gray to camouflage against the forest floor. A long bill measuring 5.9 to 7.8 cm is used to probe for earthworms. The head has three dark transverse bars on the crown and large eyes that are set toward the back of the head.

### Distribution and Abundance

The woodcock is a migratory bird found throughout the state during spring through fall. They breed in all counties of Massachusetts. Woodcocks were rare in Massachusetts at the turn of the 20<sup>th</sup> century. Their numbers increased during the early part of the 20<sup>th</sup> century with the abundance of early successional habitat. Annual woodcock singing ground surveys conducted throughout the northeast have showed a continual decline since the surveys began in 1968, until the last two years in which eastern regional trends have increased 6.4% and 1.4% respectively. Woodcocks arrive in Massachusetts by mid-March. They begin their fall migration south from Canada during late September and travel through Massachusetts during mid-October. Most birds have migrated south by mid-November. Local birds winter in the southeastern United States on the Atlantic and Gulf coastal plains.

### Habitat Description

Old farms reverting to forest generally provide optimum habitat for woodcock. Singing grounds and roost sites are situated in forest openings, old pastures, brushy fields, or bogs. Nests are generally found close by in young open woodlands. Daytime feeding habitat includes areas with poorly drained soils such as alder swales near old fields, or second-growth hardwoods mixed with aspen, birch and alder, with rich, moist soils near ponds, streams, or wet areas.

### Threats

Woodcock populations have been declining due to loss of suitable habitat to forest succession and development. Encouraging small clearcuts during timber operations and maintaining early successional areas adjacent to wetlands is the best approach to maintaining and potentially increasing woodcock populations statewide. Population numbers can also be seriously impacted by severe storms and other climatic events during migration and nesting periods. Predation also affects woodcock, but sufficient information as to the severity of the impact of predation is lacking.

## Louisiana Waterthrush (*Seiurus motacilla*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Small Streams, Riparian Forest	NE F&W Agencies

### Species Description

The Louisiana Waterthrush is a medium-sized (about 6 inches) migratory wood-warbler known more for its impressive vocal abilities and tail-wagging habit than for its drab coloration (Robinson 1995). Male and female plumages are similar and include a brown back, wings, and tail. The underparts are white with brown streaks. The head is brown with a white eye stripe and throat. Juvenile plumage is similar, but with rusty tips on tertials and distinct buff-colored wing-bars.

### Distribution and Abundance

The Louisiana Waterthrush is an uncommon breeder in central and western Massachusetts, but is rare east of Worcester County and absent from Cape Cod and the Islands (Petersen & Meservey 2003). The species' range is expanding north and east in northeastern North America, perhaps as a result of reforestation in the Northeast (Robinson 1995).

### Habitat Description

Louisiana Waterthrushes establish long (200-1200 meters), linear territories along flowing streams in continuous hardwood or mixed hardwood/conifer forests (Robinson 1995). They forage at fast rates in shallow water (< 2 cm deep), using quick, jab-like strokes to capture aquatic insects and invertebrates (Robinson 1995). Nests are usually placed in cavities in vertical stream banks. A shallow cup is occasionally excavated in the cavity, and then lined with leaves. The inside of the nest cup is constructed from fine plant materials including grasses, rootlets, fern material, and mosses. The nest is often located low on the bank, even within 6 inches of running water (Petersen & Meservey 2003).

### Threats

Little is known regarding threats to the Louisiana Waterthrush. Habitat fragmentation is a potential threat as Louisiana Waterthrushes are thought to be area-sensitive (DeGraaf & Yamasaki 2001).

### References

DeGraaf, R.M., and M. Yamasaki. 2001. *New England Wildlife*. University Press of New England, Hanover, New Hampshire.

Petersen, W.R., and W.R. Meservey. 2003. *Massachusetts Breeding Bird Atlas*. Massachusetts Audubon Society and University of Massachusetts Press, Amherst, Massachusetts.

Robinson, W.D. 1995. Louisiana Waterthrush (*Seiurus motacilla*). In: The Birds of North America, No. 151 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

## Common Eider (*Somateria mollissima*, no state or federal status)

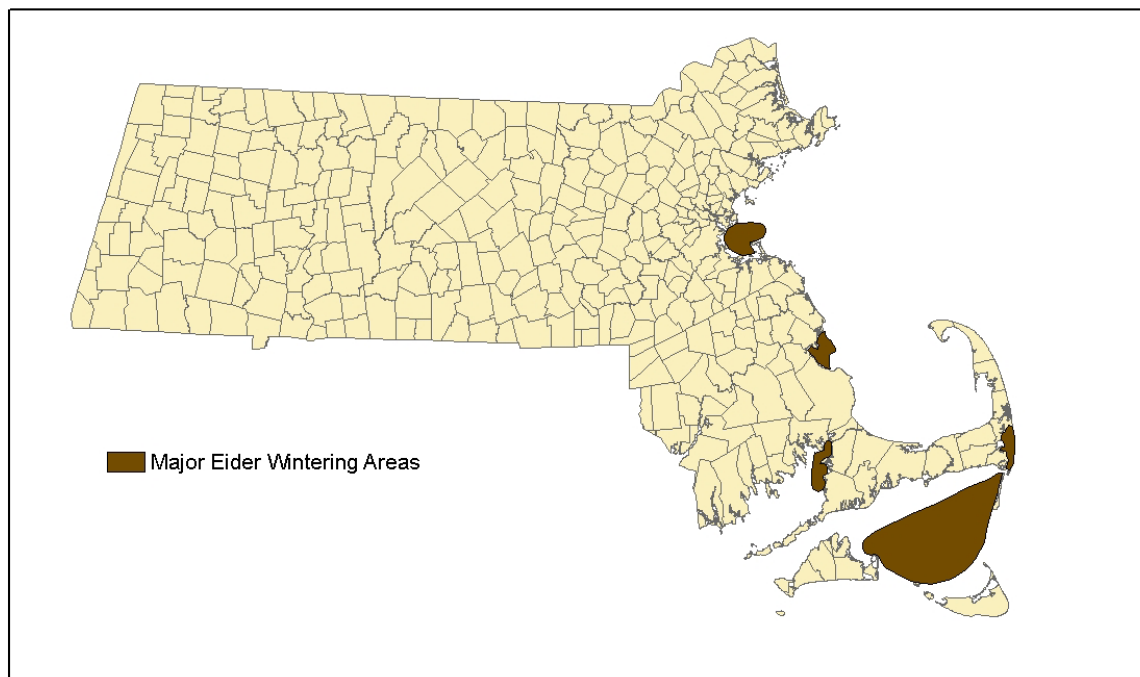
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Marine & Estuarine Habitats, Coastal Dunes/ Beaches/ Small Islands, Rocky Coastlines	Wintering Concentration

### Species Description

Common Eiders are among the largest of all ducks. The drake is black and white with a white back and head and black underneath. Drakes also have black on the top of head. Females are barred brown overall. Both sexes have notably wide and extended bill processes. Eiders are chunky-looking birds. The males range from 22 to 26 inches in length and weigh 3.9 to 4.6 pounds. Adult females range from 21 to 24 inches in length and weigh 2.6 to 3.8 pounds.

### Distribution and Abundance

Common Eiders are northern nesters. The American race breeds from central Labrador to southern Maine, though breeding colonies have also become established in Massachusetts. A 1993 colonial waterbird survey revealed eiders nesting on four islands in Boston Harbor, one off Cape Ann, and in the Elizabeth Islands chain. The American race winters from the island of Newfoundland to Massachusetts, primarily north and east of the Cape Cod Canal, but greater numbers are now wintering in Buzzards Bay. Common Eiders are among the most abundant of wintering waterfowl, but numbers can fluctuate greatly from year to year. Recent Midwinter Waterfowl Survey counts have found 20,000 to 120,000 birds in Massachusetts. Breeding surveys have indicated that Common Eiders breeding in Maine have increased significantly in number and expanded their range farther south.



### Habitat Description

American Common Eiders nest on small and large offshore islets and islands along the northern Atlantic coast and the St. Lawrence River estuary. As island nesters, they often nest in dense colonies. Nest sites may be under shrubs, driftwood, or in grasses and weeds. Eiders winter along coastal waters in bays, large estuaries, and on the open ocean. Eiders feed almost entirely on animal matter, mainly mussels. Blue mussels are especially important in the diet of the American race. Eiders typically feed in waters 6 to 25 feet deep, but can dive to twice that depth.

## Threats

Eiders have low reproductive potential, with females not nesting until 2 or 3 years old and then laying only a clutch of four eggs. This creates a potential for over-harvest of this game species. Uncontrolled harvesting on both breeding and wintering habitat for blue mussel and finfish, as well as aquaculture, sea urchin, and rockweed harvest, threaten the species, as does summer residential development on offshore nesting islands. Nest predation by increased populations of large gulls may limit productivity. Frequent outbreaks of epizootic diseases in nesting colonies can decimate local populations. Oil spills may pose a risk, as well as contamination of benthic food supplies. In Massachusetts, a wind farm is proposed for Nantucket Sound, just outside of major eider wintering areas.

The New England states and some Atlantic Canada provinces have already taken measures to restrict the harvest of eiders by reducing bag limits. In Massachusetts, restrictions have been most pronounced, with the bag being reduced from 7 to 4, no more than one of which may be female. Declining numbers of waterfowl hunters further reduce harvest pressure on eiders. Limiting access to some islands in Boston Harbor during the nesting season would be desirable. Meanwhile, the USFWS should be encouraged to resume special sea duck surveys initiated in 1991 but suspended in 2003, and the eider should be included in colonial waterbird nesting surveys in Massachusetts.

## References

- Bellrose, F. C. 1976. Ducks, Geese and Swans of North America. 2nd ed. Stackpole Books, Harrisburg, Pennsylvania.
- Heusmann, H W. 1999. Responsive management for eiders. *Massachusetts Wildlife* 49(3):2-7.
- Serie, J. and B. Raftovich. 2001. Atlantic Flyway waterfowl harvest and population survey data. July 2001. U.S. Fish and Wildlife Serv. Laurel, Maryland.



## Field Sparrow (*Spizella pusilla*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Young Forests & Shrublands	BBS Decline

### Species Description

A small bird, the Field Sparrow has an unstreaked rufous cap, streaked brown back, clear light or buffy underparts, and a short tail. The bill and legs are pink. The sexes are alike in appearance.

### Distribution and Abundance

Data on specific locations of breeding Brown Thrashers are not recorded by the NHESP. The North American Breeding Bird Survey indicates a declining Massachusetts population trend of -6.1% annually from 1966-2003 (Sauer et al. 2004). Data recorded during the Massachusetts Breeding Bird Atlas (1974-1979) confirmed breeding by Field Sparrows in about 17% of the areas surveyed. Field Sparrows were recorded across the state, with no obvious concentrations in a particular part of Massachusetts (Petersen and Meservey 2003).

### Habitat Description

Field Sparrows inhabit old fields, pastures, and the edges of woods, including powerline rights-of-way. They prefer areas of grass interspersed with shrubs or small trees, tending to avoid both grasslands devoid of woody vegetation and wooded areas without significant grassy openings.

### Threats

In Massachusetts, Field Sparrows are threatened largely by the conversion of their preferred habitat to development, to later-successional woodlands, or to intensive agriculture.

### References

Petersen, W.R., and W.R. Meservey. 2003. *Massachusetts Breeding Bird Atlas*. Massachusetts Audubon Society and University of Massachusetts Press, Amherst, Massachusetts.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2003*. Version 2004.1. USGS Patuxent Wildlife Research Center, Laurel, Maryland.

## Eastern Meadowlark (*Sturnella magna*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S4	Grasslands, Salt Marsh	BBS Decline

### Species Description

The Eastern Meadowlark is a ground-nesting passerine of grasslands, pastures and hayfields. The species breeds throughout the eastern United States, Canada's Maritime Provinces, the desert Southwest, and nearly continuously south to Panama. Individuals breeding in the northern limits of the range are short-distance migrants, often congregating in small flocks and moving south to areas free of snow. The Eastern Meadowlark, like many other birds associated with grasslands, has seen its population fluctuate widely in response to trends in agricultural practices.

### Distribution and Abundance

Eastern Meadowlarks can be found as breeding birds in nearly all regions of Massachusetts, though specific breeding sites are somewhat limited. The highest densities are in the rural farming districts of eastern Berkshire County, the Connecticut River Valley, the Sudbury River Valley, and the Middleborough-Bridgewater area of Plymouth County. Scattered pairs also regularly breed at a number of airports throughout the state.

Breeding Bird survey data shows that the population of Eastern Meadowlark has experienced an overall decline of 2.9 percent annually from 1966 to 2002. Northeastern states have seen the largest declines, with states such as Rhode Island (18.2%), Connecticut (10.5%) and Massachusetts (10.4%) seeing the sharpest declines during that timeframe. No state has recorded a significant population increase.

### Habitat Description

Eastern Meadowlarks are most common in native grasslands, prairie and savannah. They prefer moderately tall grasslands with abundant litter cover, a high proportion of grass, moderate to high forb density, and low coverage of woody vegetation. Various types of open habitats are utilized, such as tallgrass prairie, xeric grassland, and cultural grasslands such as hayfields and airports. As with most grassland birds, breeding presence and the relevance of a site for Eastern Meadowlark are directly correlated to unfragmented patch size. Typically, Eastern Meadowlarks will not initiate breeding on grasslands of less than ten acres, and a site will often need greater than 100 acres of contiguous suitable habitat to support a large breeding population.

### Threats

The decline of Eastern Meadowlark populations in Massachusetts is attributed to loss of suitable nesting habitat due to landscape conversion (suburban sprawl, succession, and incompatible agricultural practices). Agriculturally, the main threat to breeding Eastern Meadowlarks in Massachusetts is the mowing of hayfields before the nesting cycle is complete. This results in near complete egg/nestling mortality, some adult mortality, and an overall decrease in species reproductive success. High winter mortality during especially severe winters is also a contributing factor in local declines.

Land-use practices that provide suitable nesting habitat should be encouraged, particularly the development of incentives for ecologically sensitive agricultural practices that promote the increased acreage of hayfields and pastures that are in a delayed harvest (hayfields) or grazed on a rotation (pastures). Mowing should be delayed until August to ensure fledgling survival. On conservation properties with suitable landscapes, large natural grasslands that are mown on a 3-5 year rotation, or when appropriate, managed by controlled burning, should be encouraged. However, it should be noted that Meadowlarks often will not recolonize a burned area within two years of the initial fire. In areas of more "industrialized" habitats, such as airports, efforts should be made to coordinate with site managers to reduce areas of grassland succession and to avoid mowing during the nesting season. Where suitable habitat currently exists, efforts should be made to protect the landscape from development.

## References

- Askins, R. R. 2000. *Restoring North American Birds*. Yale University, New Haven, Connecticut.
- Hull, S.D. 2000 (revised 2002). *Effects of management practices on grassland birds: Eastern Meadowlark*. Northern Prairie Wildlife Research Center, Jamestown, ND. 35 pages.
- Jones, A. L., G. Shriver, and P. Vickery. 2001. Regional Inventory of Grassland Birds in New England and New York, 1997-2000. Massachusetts Audubon Society, Lincoln, Massachusetts.
- Lanyon, W.E. 1995. Eastern Meadowlark (*Sturnella magna*). In *The Birds of North America*, No. 160 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.
- Sauer, J.R., J.E. Hines, and J. Fallon. 2004. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2003*. Version 2004.1. USGS Patuxent Wildlife Research Center, Laurel, Maryland.
- Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Brown Thrasher (*Toxostoma rufum*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Pitch Pine/Scrub Oak, Young Forests & Shrublands	BBS Decline

### Species Description

Brown Thrashers are large mimids, about 11 ½ inches long. Adults are rufous above, with light underparts streaked with black, a long, rufous tail, and a relatively long, rather down-curved bill. The sexes are alike in appearance.

### Distribution and Abundance

Data on specific locations of breeding Brown Thrashers are not recorded by NHESP. The North American Breeding Bird Survey indicates a declining Massachusetts population trend of -9.8% annually from 1966-2003 (Sauer et al. 2004). Data recorded during the Massachusetts Breeding Bird Atlas (1974-1979) confirmed breeding by Brown Thrashers in about 30% of the areas surveyed. Brown Thrashers were recorded across the state, but concentrated in the eastern half of the state and in the lower Connecticut River valley (Petersen and Meservey 2003).

### Habitat Description

Brown Thrashers inhabit brushy, early-successional areas, such as old fields, hedgerows, pitch pine/scrub oak areas, powerline rights-of way, and other disturbed areas.

### Threats

Nests of Brown Thrashers are predated by snakes, domestic cats, and other birds; there is a high rate of nest predation. In Massachusetts, the continuing decline in suitable breeding habitat is likely to be the major threat to Brown Thrashers. Early successional habitats in Massachusetts are rapidly being converted to development or intensive agriculture. Succession to closed-canopy woodlands and suppression of natural disturbances such as fire (especially in pitch pine/scrub oak areas) also eliminate Brown Thrasher habitat.

### References

- Cavitt, J.F., and C.A. Haas. 2000. Brown Thrasher (*Toxostoma rufum*). In: The Birds of North America, No. 557 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.
- Petersen, W. R., and W. R. Meservey. 2003. *Massachusetts Breeding Bird Atlas*. University of Massachusetts Press, Amherst, Massachusetts.
- Sauer, J.R., J.E. Hines, and J. Fallon. 2004. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2003*. Version 2004.1. USGS Patuxent Wildlife Research Center, Laurel, Maryland.

## Blue-winged Warbler (*Vermivora pinus*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Young Forests & Shrublands	PIF Tier I

### Species Description

The Blue-winged Warbler is an arthropod-gleaning passerine associated with areas of early-to-mid-successional habitat. It breeds in the eastern United States, primarily from southeast Michigan across to southern New England, and south through the Ohio Valley. Winter range is from Atlantic Mexico into Panama. The Blue-winged Warbler is a single-brood species, building its nest on or near the ground in forest-field ecotones. This species is genetically very similar to the Golden-winged Warbler, and interbreeding is regularly documented.

### Distribution and Abundance

The Massachusetts population of Blue-Winged Warbler is loosely distributed across the state, with major concentrations occurring in the Connecticut River Valley, northeastern Essex County, and in the second-growth lowlands between Boston and Providence. They are scarce breeders on Cape Cod and the Islands, and have not been recorded at elevations above 1,700 feet in Berkshire County.

Breeding Bird survey data shows that the population of Blue-winged Warbler has experienced an overall decline of 0.41 percent annually from 1966 to 2002. The greatest declines have occurred in Alabama (7.90%), Kentucky (7.34%), New Jersey (4.85%) and Connecticut (3.2%). In that time only one area, Pennsylvania, has experienced a significant population increase (3.11%). Massachusetts populations have declined by 1.06 percent annually.

The Blue-winged Warbler is considered a Tier I Conservation Priority by Partners In Flight, and is listed as a Watchlist Species by the National Audubon Society.

### Habitat Description

The Blue-winged Warbler nests in early to mid-successional habitat, typically choosing a nest site in habitats that include saplings at the forest edge of clearings comprised of dense shrubby thickets. The species is not sensitive to patch size, and often is found breeding in dense shrub vegetation associated with clearcuts and powerline right-of-ways. Patches with somewhat even structural diversity are favored, especially those composed of a mosaic of shrub, herb and woody vegetation (<15'). Suitable habitat can occur at the edges of wetlands and damp areas, or dry upland areas, independent of the presence or absence water. Defended territories of unmated males are usually in wetter habitat.

In Massachusetts, the Blue-winged Warbler breeds in brushy, overgrown pastures and at the edges of dense secondary growth.

### Threats

The major threat to Blue-winged Warbler populations in Massachusetts is loss of suitable habitat due to landscape conversion and succession. This species is also a frequent host of the Brown-headed Cowbird. Though shrubland birds as a group do not appear to be as sensitive to patch-size as other groups of birds, the indirect affects of suburban sprawl can be important through the magnified risks on ground nests from predation (i.e. domestic cats, raccoons) and cowbird parasitism.

Management for the Blue-winged Warbler should seek to maintain habitat diversity in the region, specifically to increase the array of woody plant communities in early to midseral stages of secondary succession. A variety of management tools, including mechanical removal of vegetation to mimic disturbance, and prescribed burns in fire-dependent habitats, should be employed to achieve suitable habitat. In landscapes that are primarily forested, early successional forest patches should be included in rotational forest management where several small and several large early successional patches are rotated through the forest matrix. Managing utility rights-of-way has enormous potential for increasing habitat availability for shrubland birds. Capitalizing on these already existing and essentially

permanent shrublands should be encouraged whenever possible. Where suitable habitat currently exists, efforts should be made to protect the landscape from development.

### **References:**

Askins, R. R. 2000. *Restoring North American Birds*. Yale University, New Haven, Connecticut.

Gill, F.B., R.A. Canterbury, and J.L. Confer. 2001. Blue-winged Warbler (*Vermivora pinus*). In *The Birds of North America*, No. 584 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2003*. Version 2004.1. USGS Patuxent Wildlife Research Center, Laurel, Maryland.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## Canada Warbler (*Wilsonia canadensis*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Forested Swamps, Riparian Forest, Upland Forest	NE F&W Agencies, PIF Tier I

### Species Description

The Canada Warbler is a brightly-colored migratory wood-warbler 5-6 inches long. Male and female plumages are similar, but the female is duller overall. The upperparts are bluish gray; underparts are bright yellow. The yellow and gray portions of the head are separated by black. The black area extends beneath the eye along the side of the throat to meet a series of vertical rows of black spots that form a “necklace” across the upper breast. The undertail coverts are white. Juvenile males are similar to adults, but duller, and the juvenile female is duller of all, although adult markings are still recognizable.

### Distribution and Abundance

The Canada Warbler is a fairly common breeder from the Connecticut River Valley west and in northwestern Worcester County. It is uncommon in eastern Massachusetts, and completely absent from Cape Cod and the Islands (Petersen & Meservey 2003). The Massachusetts population is believed to be in decline based on data from the North American Breeding Bird Survey (Sauer et al 2004).

### Habitat Description

Canada Warblers occupy moist or swampy hardwood and mixed hardwood/conifer forests with dense undergrowth, (Veit & Petersen 1993). Their diet consists of insects and spiders which are captured by hawking, hovering, and gleaning low in the understory (Conway 1999). Nests are well-concealed in dense vegetation and are constructed on or near the ground, such as within the roots of an upturned tree or on top of a mossy log (Conway 1999).

### Threats

Habitat fragmentation appears to be the primary threat to this species, which is considered highly area-sensitive (Conway 1999). Active forest management can be compatible with sustaining Canada Warbler populations. Generally, management practices which increase understory vegetation density (such as reducing deer density) enhance Canada Warbler habitat, while practices which decrease understory density detract from their habitat (Conway 1999).

### References

- Conway, C.J. 1999. Canada Warbler (*Wilsonia canadensis*). In: *The Birds of North America*, No. 421 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.
- Petersen, W.R., and W.R. Meservey. 2003. *Massachusetts Breeding Bird Atlas*. Massachusetts Audubon Society and University of Massachusetts Press, Amherst, Massachusetts.
- Sauer, J.R., J.E. Hines, and J. Fallon. 2004. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2003*. Version 2004.1. USGS Patuxent Wildlife Research Center, Laurel, Maryland.
- Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## White-throated Sparrow (*Zonotrichia albicollis*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S5	Young Forests & Shrublands, Peatlands, Forested Swamps	BBS Decline

### Species Description

The White-throated Sparrow is a familiar songbird that breeds in coniferous forests throughout much of Canada, the Great Lakes region, New England and New York. A wide-spread migrant, this species is often encountered at feeding stations on its wintering grounds across the eastern United States, the desert southwest and the Pacific coast of California and Oregon. Known for its distinctive song, the White-throated Sparrow also is unique for its dimorphism in both plumage and behavior. Within populations there are white-striped and tan-striped individuals that seek out the opposite morph as mates, resulting in the perpetuation of clearly dimorphic individuals.

### Distribution and Abundance

In Massachusetts, White-throated Sparrows are fairly common breeders from Worcester County west, but are considered rare and local breeders in the eastern part of the state. They are absent as breeders on Cape Cod and the Islands. They are especially found in the higher elevations of Worcester County and throughout the Berkshires.

Breeding Bird Survey data indicate that the population of the White-throated Sparrow has experienced an overall decline of 0.7 percent annually from 1966-2002. The region of greatest decline is Southern New England (11.0%), with the individual states of Connecticut (15.2%) and Massachusetts (8.3%) showing the most dramatic downturns. Overall, populations have been shown to increase during spruce budworm outbreaks, and to decrease after especially cold winters.

### Habitat Description

Breeding White-throated Sparrows are found in coniferous and mixed forests, especially those with low, dense vegetation. They are particularly attracted to areas of second growth, such as beaver meadows, open bogs, forests affected by logging, fire, or insect damage, and areas of low, dense trees near the tree line. Nest sites are generally on or near the ground under dense vegetation along the edge of a clearing. In Massachusetts, White-throated Sparrows are found in the coniferous and mixed forests of the western counties, and in the east, can occasionally be found breeding in Red Maple and White Cedar swamps.

### Threats

The primary threat to White-throated Sparrows in Massachusetts is loss of suitable breeding habitat due to development. Secondly, the succession of breeding territories toward a more mature, closed canopy structure is a limiting factor in the amount of available breeding habitat.

White-throated Sparrows have been shown to be particularly sensitive to the aerial spraying of Fenitrothoin over breeding territories, which can lead to both adult mortality and reduced reproductive success. High winter mortality during especially severe winters is also a contributing factor in local declines.

In primarily suitable forested landscapes, early successional forest patches should be included in rotational forest management where several small and several large early successional patches are rotated through the forest matrix. Where suitable habitat currently exists, efforts should be made to protect the landscape from development.

### References:

Falls, J.B., and J.G. Kopachena. 1994. White-throated Sparrow (*Zonotrichia albicollis*). In *The Birds of North America*, No. 160 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.



Petersen, W.R., and W.R. Meservey. 2003. *Massachusetts Breeding Bird Atlas*. Massachusetts Audubon Society and University of Massachusetts Press, Amherst, Massachusetts.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2003*. Version 2004.1. USGS Patuxent Wildlife Research Center, Laurel, Maryland.

Veit, R., and W.R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, Massachusetts.

## **E. Mammals**

## Water Shrew (*Sorex palustris*, State Special Concern)

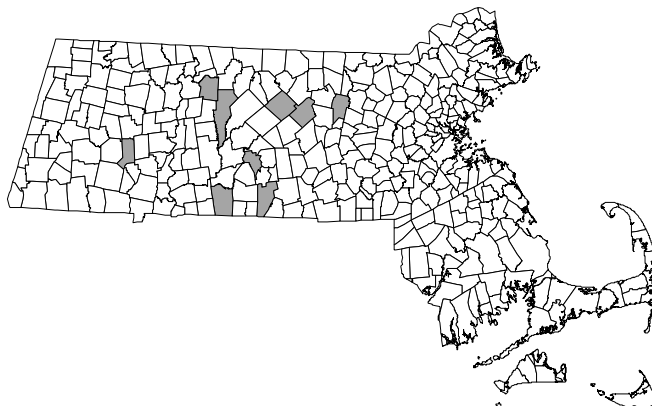
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Vernal Pools, Lakes & Ponds, Forested Swamps, Marshes & Wet Meadows	State List; NE F&W Agencies

### Species Description

The Water Shrew is the largest long-tailed shrew in New England. It measures 144-158 mm (5.7-6.2 in) in length, with its long tail accounting for more than half of its total length; and weighs from 10-16 g (approximately 1/3 oz). The unique feature of the Water Shrew is its big “feathered” hind feet. The third and fourth toes of the Water Shrew’s hind feet are slightly webbed, and all toes as well as the foot itself have conspicuous stiff hairs along the sides. In winter, the Water Shrew is glossy, gray-black above tipped with silver, and silvery-buff below, becoming lighter on the throat and chin. It has whitish hands and feet, and a long, bicolored tail covered with short, brown bristles. In summer, its fur is more brownish above and slightly paler below, with a less frosted appearance. The body of the Water Shrew is slender with a long, narrow snout. Its eyes are minute but visible, and its ears are small and hidden in velvety fur. This species is especially adapted for semiaquatic life. Not only are the large webbed hind feet an adaptation for aquatic living, but the fur of the Water Shrew is so dense that it is impenetrable by water and serves to trap air bubbles. The Water Shrew can remain submerged for about 15 seconds but only while swimming vigorously, as the air trapped in the fur makes it as buoyant as a cork.

### Distribution and Abundance

There have been nine occurrences of Water Shrew documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Water Shrew

### Habitat Description

The Water Shrew is seldom found more than a few yards from the nearest water - a spring, a mountain lake, or, most commonly, the banks of a swift, rocky stream, usually near boreal or mixed forest. It prefers heavily wooded areas and is rarely found in marshes that are devoid of bushes and trees. It may be found in beaver lodges and muskrat houses in winter.

### Threats

Current threats to the Water Shrew are many: fragmentation of suitable habitat; warming and siltation of headwater streams and ponds resulting from logging, clearing for agriculture, and road-building; acid rain and its effects on the forests and waters that provide the shrew’s habitat and food supply; loss of wetland habitat; and potentially, the introduction of new predators such as smallmouth and largemouth bass.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1994. Water Shrew (*Sorex palustris*) Fact Sheet.

## Rock Shrew (*Sorex dispar*, State Special Concern)

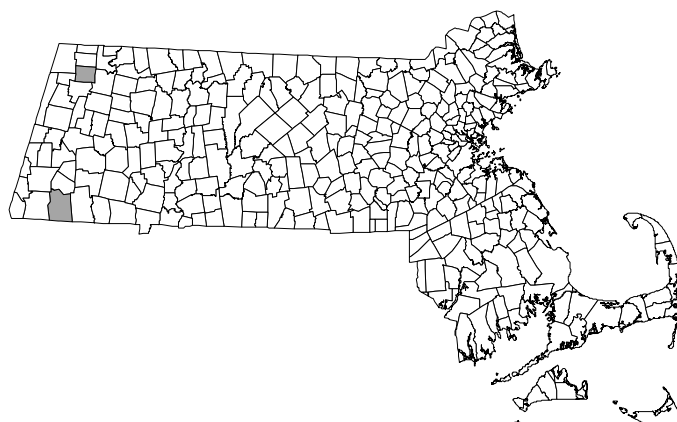
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S3	Rock Cliffs/ Ridgetops/Talus Slopes	State List

### Species Description

The Rock Shrew is a large, dull gray-black shrew with nearly uniform coloration in all seasons. The tail is indistinctly bicolored, black above and usually paler below; and is long, sparsely haired, and rather heavy and ropelike in appearance. The body of the Rock Shrew is slender, and the snout is long, slender, and highly movable, with conspicuous vibrissae. The eyes are minute but visible, and the ears usually project slightly above the fur. The skull is long, narrow, and flattened, with distinctive dentition. Measurements range from 101 to 139 mm (3.9 to 5.3 in) in overall length; the tail is 50–60 mm (2.0–2.3 in) of that overall length. Weights vary from 4 to 6 g (0.14 to 0.21 oz).

### Distribution and Abundance

There have been two occurrences of Rock Shrew documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Rock Shrew

### Habitat Description

The Rock Shrew prefers cold, deep, damp coniferous forests, particularly old-growth forest with hemlock or spruce, in boreal pockets at altitudes as high as 6,000 ft. It is found in depressions of moist moss-covered logs, in crevices of large mossy rock piles, among shaded, wooded rock slides or talus, just beneath low, shaded cliffs, and at the edges of moist grassy clearings surrounded by swampy woods. Occasionally the Rock Shrew occurs in much drier spots, but almost invariably it is associated with rock crevices and talus slopes.

### Threats

Currently, there appears to be no immediate threat to the habitat of the Rock Shrew. Building roads may have the only possible effect on the Rock Shrew, but it is believed that this will have no major impact on the populations. Specific management recommendations are to protect streams and moist rocky hillsides at the higher elevations.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1994. Rock Shrew (*Sorex dispar*) Fact Sheet.

## Indiana Myotis (*Myotis sodalis*, State Endangered, Federal Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G2	SH	Springs, Caves & Mines	Federal List; State List; Globally Rare

### Species Description

The Indiana Myotis is a small bat, very similar to the Little Brown Bat, *Myotis lucifugus*. Indiana Bats weigh between 5 and 11 grams and measure about 80 mm in total length, with a wingspread of 240 to 267 mm. They have uniformly pinkish-brown fur.

### Distribution and Abundance

There are no recent documented occurrences of Indiana Myotis in Massachusetts. Historic records in Massachusetts are from the towns of Chester, Egremont, Sturbridge, and Worcester (NHESP database, accessed December, 2004). Note that the species identification of some of these records is in doubt and no specimens of *Myotis sodalis* from Massachusetts currently exist.

### Habitat Description

The hibernacula used by Indiana Myotis in Massachusetts historically are abandoned mines, with deep shafts. In summer, they roost in small colonies in wooded areas, usually under the dead bark of trees.

### Threats

Suitable hibernacula still exist in Massachusetts for Indiana Myotis; however, the species has not been seen in the state since 1939. Elsewhere in its range, the Indiana Myotis is threatened by disturbances during overwintering, destruction of hibernacula, and declines in populations of prey species. Because this species hibernates in a very few hibernacula range-wide, any disturbance during hibernation is likely to affect a sizeable percentage of the entire species.

### References

Massachusetts Natural Heritage & Endangered Species Program. 1984. Indiana Myotis (*Myotis sodalis*) Fact Sheet.

Whitaker, J. O., Jr., and W. J. Hamilton, Jr. 1998. *Mammals of the Eastern United States*. Third edition. Comstock Publishing Associates, Ithaca, New York.

## Eastern Small-footed Bat (*Myotis leibii*, State Special Concern)

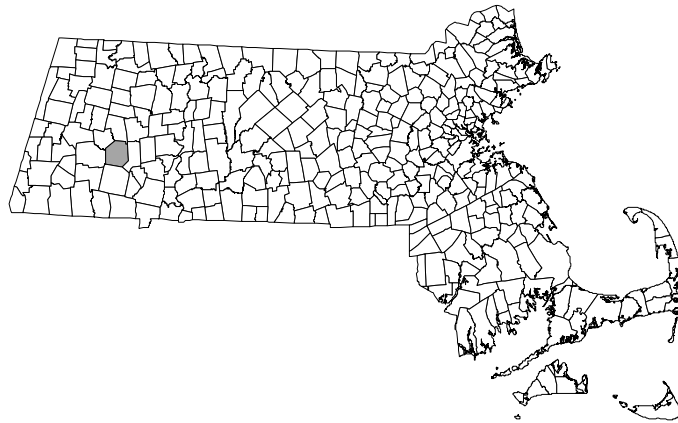
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S1	Springs, Caves & Mines	State List; Globally Rare; NE F&W Agencies

### Species Description

The Eastern Small-footed Bat is the smallest member of its genus in eastern North America, with the forearm measuring only 1.25 to 1.5 inches. It has golden-tinted, almost yellowish fur and relatively short pinkish forearms. It can be identified by the black facial mask, black ears, long-keeled calcar, and the absence of a dark shoulder patch. When the ears are laid forward, they extend slightly beyond the nose.

### Distribution and Abundance

There have been two occurrences of Eastern Small-footed Bat documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Eastern Small-footed Bat

### Habitat Description

Buildings seem to provide suitable places for shelter in summer. In winter, the species is found in caves and mines. In Massachusetts, it is restricted to caves in the foothills of mountains rising to 2,000 feet, with hemlock, spruce, and white cedar predominating among the conifers.

### Threats

The Eastern Small-footed Bat is threatened largely by disturbances during hibernation, resulting in overwintering mortality.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. No date. Small-footed Bat (*Myotis leibii*) Fact Sheet.

## Southern Bog Lemming (*Synaptomys cooperi*, State Special Concern)

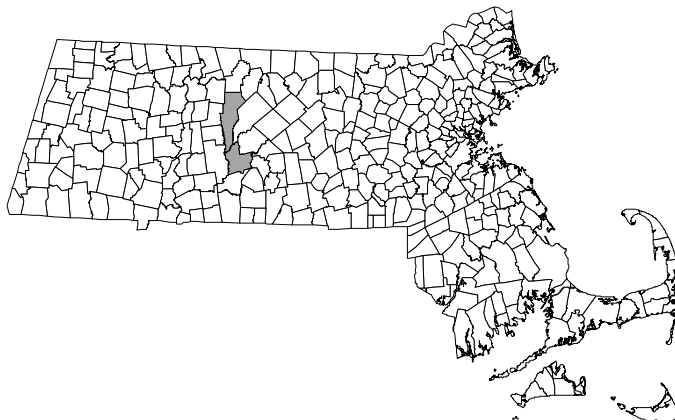
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Peatlands, Grasslands, Young Forests & Shrublands	State List

### Species Description

The Southern Bog Lemming is a small, chunky rodent, with small eyes and ears that are nearly concealed in the long, loose, shaggy fur. The skull is broad, and the short rostrum gives this species an abrupt profile. This species is can be distinguished from other small mammals by the combination of its short tail (only slightly longer than its hind foot) and grooved upper incisors. The sexes are colored alike, with no apparent seasonal variation. The adult fur is brown to chestnut above, with a grizzled appearance. The sides and underparts are silvery, with no sharp line of demarcation on the sides. The tail is indistinctly bicolored, brownish above and whitish below. The feet are brownish black. Southern Bog Lemmings range in total length range from 11.5 to 13.5 cm (4.5 to 5.3 in), of which the tail is 1.8 to 2.4 cm (0.7 to 0.9 in). Weights vary from 20 to 40 g (0.7 to 1.4 oz).

### Distribution and Abundance

There have been six occurrences of Southern Bog Lemming documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). Historically, the Southern Bog Lemming apparently has always been extremely rare in Massachusetts. Records show that prior to 1980, six individual sightings were documented from five different towns (Belchertown, Dunstable, Lunenburg, Plymouth, and Wareham). Since 1980, there have been four verified sightings in two towns (New Salem and Ware, shown on the map below) reported to NHESP.



Massachusetts Towns with Recent Occurrences of Southern Bog Lemming

### Habitat Description

The common name Bog Lemming is misleading when attempting to locate the favored habitat of this elusive microtine. Its habitat is highly variable, comprised of bogs, especially with sphagnum, sedge meadows in old-growth forest, clear-cuts in forests, open grasslands, orchards, post-fire successional communities, and even cornfields.

### Threats

The greatest threat to the Southern Bog Lemming is destruction of its habitat. Woodland vernal pools, sedge meadows, and wooded wetlands need to be protected at known locations of this species. Populations of the Southern Bog Lemming are small and isolated. Every effort should be made to protect these populations as natural recolonization will be difficult if a local population goes extinct.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1994. Southern Bog Lemming (*Synaptomys cooperi*) Fact Sheet.

## Sperm Whale (*Physeter catodon*, State Endangered, Federal Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S1	Marine & Estuarine Habitats	Federal List; State List; Globally Rare

### Species Description

Unlike most of the whales found in Massachusetts waters, the Sperm Whale is a toothed whale. Males commonly reach a length of 50 feet, while females are considerably smaller, up to 35 or 40 feet long. Sperm Whales have enormous, blocky heads, with a shorter, narrow jaw underneath. The single blowhole is on the left side of the front of the head.

### Distribution and Abundance

Data on specific locations of oceanic animals are not recorded by NHESP. Sperm Whales are exceedingly rare in Massachusetts waters.

### Habitat Description

Sperm Whales are generally found in deep, relatively warm water at the edge of the continental shelf and further offshore. It is rare that one approaches landward over the continental shelf.

### Threats

As for most whales in Massachusetts waters, current threats to Sperm Whales include entanglement in fishing gear or nets, collisions with ships, declining prey stocks, oil spills, ingestion of plastic bags and other debris, and the generalized effects of oceanic pollution.

### Reference

Katona, S. K., V. Rough, and D. T. Richardson. 1993. *A Field Guide to Whales, Porpoises, and Seals from Cape Cod to Newfoundland*. Smithsonian Institution Press, Washington, D.C.



## Fin Whale (*Balaenoptera physalus*, State Endangered, Federal Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S1S2	Marine & Estuarine Habitats	Federal List; State List; Globally Rare

### Species Description

Fin Whales are the most common large baleen whales found off Massachusetts. The coloration of the jaws, baleen, and belly is asymmetrical: on the right, the lips, anterior baleen, and lateral side of the belly are white or light colored; these areas are dark on the left side. Mature Fin Whales are up to about 60 feet long.

### Distribution and Abundance

Data on specific locations of oceanic animals are not recorded by NHESP. Fin Whales are most common in Massachusetts waters from April to October, but occasionally a few individuals overwinter.

### Habitat Description

Fin Whales inhabit the cool ocean waters over the continental shelf, occasionally coming near the coastline.

### Threats

As for most whales in Massachusetts waters, current threats to Fin Whales include entanglement in fishing gear or nets, collisions with ships, declining prey stocks, oil spills, ingestion of plastic bags and other debris, and the generalized effects of oceanic pollution.

### Reference

Katona, S. K., V. Rough, and D. T. Richardson. 1993. *A Field Guide to Whales, Porpoises, and Seals from Cape Cod to Newfoundland*. Smithsonian Institution Press, Washington, D.C.

## Sei Whale (*Balaenoptera borealis*, State Endangered, Federal Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S1S2	Marine & Estuarine Habitats	Federal List; State List; Globally Rare

### Species Description

A medium-sized baleen whale, Sei Whales are up to 50 feet long. Sei Whales are dark above, light below, sometimes with light-colored, oblong spots on the sides.

### Distribution and Abundance

Data on specific locations of oceanic animals are not recorded by NHESP. Sei Whales are seldom seen in Massachusetts waters.

### Habitat Description

Sei Whales seem to prefer the warmer waters at the edge of the continental shelf and beyond into open ocean.

### Threats

As for most whales in Massachusetts waters, current threats to Sei Whales include entanglement in fishing gear or nets, collisions with ships, declining prey stocks, oil spills, ingestion of plastic bags and other debris, and the generalized effects of oceanic pollution.

### Reference

Katona, S. K., V. Rough, and D. T. Richardson. 1993. *A Field Guide to Whales, Porpoises, and Seals from Cape Cod to Newfoundland*. Smithsonian Institution Press, Washington, D.C.

## Blue Whale (*Balaenoptera musculus*, State Endangered, Federal Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S1	Marine & Estuarine Habitats	Federal List; State List; Globally Rare

### Species Description

A very large baleen whale, Blue Whales are as much as 85 feet or more in length and can weigh up to 100 tons. Blue Whales are indeed blue-gray, with irregular light spotting. The blowhole is protected by a raised ridge anterior to the blowhole.

### Distribution and Abundance

Data on specific locations of oceanic animals are not recorded by NHESP. Blue Whales are exceedingly rare in Massachusetts waters.

### Habitat Description

Blue Whales prefer very cold ocean waters and are usually found farther north than the Massachusetts coast.

### Threats

As for most whales in Massachusetts waters, current threats to Blue Whales include entanglement in fishing gear or nets, collisions with ships, declining prey stocks, oil spills, ingestion of plastic bags and other debris, and the generalized effects of oceanic pollution.

### Reference

Katona, S. K., V. Rough, and D. T. Richardson. 1993. *A Field Guide to Whales, Porpoises, and Seals from Cape Cod to Newfoundland*. Smithsonian Institution Press, Washington, D.C.

## Humpback Whale (*Megaptera novaeangliae*, State Endangered, Federal Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S1S2	Marine & Estuarine Habitats	Federal List; State List; Globally Rare

### Species Description

The Humpback Whale is a medium-sized baleen whale. The humpback is a rather bulky and stout whale, ranging from 30 to 60 feet in length and weighing 23 to 30 tons. Females tend to be larger than males. The whale's flippers are white and very long, almost one-third of its body length. "Knob-like" protuberances on their head, snout, and flippers containing vestigial hair follicles are one of the characteristics that distinguish the humpback from other whales. Another defining characteristic of the humpback is its pear-shaped, double blowhole. Their dorsal fins are relatively small, varying in size and shape.

### Distribution and Abundance

Data on specific locations of oceanic animals are not recorded by NHESP. Humpbacks can be found feeding off the Massachusetts coast from spring through fall, especially on Jefferys Ledge and Stellwagon Bank.

### Habitat Description

Humpback Whales feed in the relatively cool ocean over the continental shelf, and are often seen hunting over Jefferys Ledge or Stellwagon Bank.

### Threats

Humpback Whales are threatened by entanglements with fishing gear, pollution, and collisions with boats. Contributing factors to the mortality of calves include predation, red-tide toxins, and ice entrapment. The greatest cause of natural mortality among calves is attacks by killer whales (*Orcinus orca*) and sharks.

### Reference

Katona, S. K., V. Rough, and D. T. Richardson. 1993. *A Field Guide to Whales, Porpoises, and Seals from Cape Cod to Newfoundland*. Smithsonian Institution Press, Washington, D.C.

## Northern Right Whale (*Eubalaena glacialis*, State Endangered, Federal Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G1	S1S2	Marine & Estuarine Habitats	Federal List; State List; Globally Rare

### Species Description

A medium-sized baleen whale, Northern Right Whales grow up to 50 feet in length can weigh up to 50 tons. There is no dorsal fin. The body is darkly mottled, with light-colored growths (callosities) on the enormous head.

### Distribution and Abundance

Data on specific locations of oceanic animals are not recorded by NHESP. In Massachusetts waters, Northern Right Whales are seen in Cape Cod Bay, on Stellwagon Bank, and off Cape Ann, in late winter to spring, and again in the fall.

### Habitat Description

Northern Right Whales inhabit the relatively cool water over the continental shelf and are occasionally seen near shore.

### Threats

As for most whales in Massachusetts waters, current threats to Northern Right Whales include entanglement in fishing gear or nets, collisions with ships, declining prey stocks, oil spills, ingestion of plastic bags and other debris, and the generalized effects of oceanic pollution.

### Reference

Katona, S. K., V. Rough, and D. T. Richardson. 1993. *A Field Guide to Whales, Porpoises, and Seals from Cape Cod to Newfoundland*. Smithsonian Institution Press, Washington, D.C.

## Moose (*Alces alces*, no state or federal status)

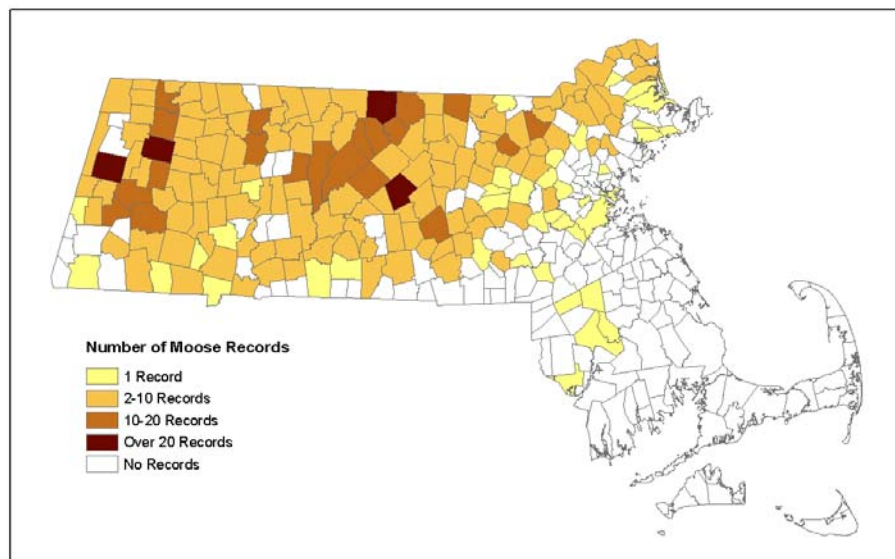
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Large Unfragmented Landscape Mosaic	Large Home Range

### Species Description

Moose are the largest deer species in Massachusetts. It is a dark brown animal with lighter colored legs, high-humped shoulders, and a distinctive flap of skin protruding beneath the lower jaw. Adult moose weights range from 360 to 600 kg for males and 270 to 360 kg for females. Moose are about 280 cm in length and stand 185 to 195 cm tall at the shoulder.

### Distribution and Abundance

Moose are reclaiming their historic range in Massachusetts and moving into areas where they have not been seen for hundreds of years. Moose have been documented in 190 of the 351 towns in Massachusetts from 1970 to February 2005. Seventy-one percent of all moose reports have been since 1995. Source of information: MassWildlife moose database, accessed February, 2005.



Massachusetts Towns with Recent Occurrences of Moose from 1970 to 2005

### Habitat Description

In all areas that have moose populations, moose use a mosaic of habitats for both food and protection. There are seasonal differences in the food intake of moose, but they seek highly nutritious, low-toxin foliage and browse. Early successional forests provide important foraging habitat for the moose throughout the year, while submerged aquatic vegetation can be utilized during the summer months. Dense conifer stands provide thermal cover during the clear and cold winter months.

### Threats

In Massachusetts, moose are at the southern end of the historic range in northern hardwood and eastern broadleaf forest types. Currently, there is little information on the specific habitat requirements for moose in Massachusetts and the northeast United States. Understanding how these large herbivores use and move throughout the diverse human-dominated landscape of Massachusetts will provide much needed information on future population growth and potential habitat destruction by moose.

## References

- Geist, V. 1998. Moose. Pages 223-254 in *Deer of the World, Their Evolution, Behavior, and Ecology*. Stackpole Books, Mechanicsburg, Pennsylvania.
- Karns, P. D. 1997. Population Density and Trends. Pages 125-140 in F. W. Franzmann and C. C. Schwartz (eds.), *Ecology and Management of the North American Moose*. Smithsonian Institution Press, Washington and London.
- McDonald, J. E. 2000. The moose question. *Massachusetts Wildlife*. 50: 24-35.
- Vecellio, G. M., R. D. Deblinger, and J. E. Cardoza. 1993. Status and management of moose in Massachusetts. *Alces* 29: 1-7.

## Silver-haired Bat (*Lasionycteris noctivagans*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	SU	Upland Forest	NE F&W Agencies

### Species Description

The fur of Silver-haired Bats is dark blackish-brown to brown, with the tips of the hairs on the back tipped with silver. Total length is about 100 mm; weight is about 10.5 grams. The sexes are alike.

### Distribution and Abundance

Data on specific locations of Silver-haired Bat are not recorded by NHESP. Silver-haired Bats do not hibernate in Massachusetts; they are only known from the state during the summer and migration. Silver-haired Bats have not been documented breeding in Massachusetts (Cardoza et al. in prep.). Whitaker and Hamilton (1998) note that only females migrate north from the wintering grounds. This would indicate that Silver-haired Bats found in Massachusetts are likely to be mostly females and young of the year. Cardoza et al. (in prep.) note that Silver-haired Bats are the most uncommon tree bat in the state, with records from only 15 of the 351 municipalities.

### Habitat Description

Silver-haired Bats in Massachusetts inhabit forests, particularly along rivers and lakes, over which they hunt. They often roost solitarily in hollow trees, crevices in rocks and cliffs, and under loose bark, but females and their young may form small maternity colonies in the same kinds of roost sites.

### Threats

As for most bats, Silver-haired Bats are threatened by the precipitous decline in larger moths due to parasitism by *Compsilura*. Other threats include declines in other prey species, due to insecticide spraying or prey species habitat destruction, and outright destruction of bat habitat, due to conversion to development, intensive logging, or agriculture.

### References

Cardoza, J. E., G. S. Jones, and T. W. French. In prep. Distribution and status of bats in Massachusetts, USA.

Whitaker, J. O., Jr., and W. J. Hamilton, Jr. 1998. *Mammals of the Eastern United States*. Third edition. Comstock Publishing Associates, Ithaca, New York.



## Eastern Red Bat (*Lasiurus borealis*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S4	Upland Forest	NE F&W Agencies

### Species Description

Eastern Red Bats have reddish or rusty-colored fur, with white-tipped hairs on their backs and breasts. Males have a bright brick red fur, while females have duller, buffy-chestnut fur, with much more white tipping of the fur than males do. Total length is about 112mm; the weight ranges from 9.5 to 16 grams.

### Distribution and Abundance

Data on specific locations of Eastern Red Bat are not recorded by NHESP. Eastern Red Bats do not hibernate in Massachusetts; they are only known from the state during the summer and migration. The only breeding records for this species are historical (Cardoza et al. in prep.). It has been recorded from all 14 counties and from 52 of the 351 municipalities (Cardoza et al. in prep.).

### Habitat Description

Eastern Red Bats are forest-dwellers in Massachusetts, although they may be seen feeding over water or at lights. Roosting is solitary, usually in thickly leafed parts of trees or other vegetation.

### Threats

As for most bats, Eastern Red Bats are threatened by the precipitous decline in larger moths due to parasitism by *Compsilura*. Other threats include declines in other prey species, due to insecticide spraying or prey species habitat destruction, and outright destruction of bat habitat, due to conversion to development, intensive logging, or agriculture.

### References

Cardoza, J. E., G. S. Jones, and T. W. French. In prep. Distribution and status of bats in Massachusetts, USA.

Whitaker, J. O., Jr., and W. J. Hamilton, Jr. 1998. *Mammals of the Eastern United States*. Third edition. Comstock Publishing Associates, Ithaca, New York.

## Hoary Bat (*Lasiurus cinereus*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	SU	Upland Forest	NE F&W Agencies

### Species Description

The Hoary Bat is the largest bat found in Massachusetts, up to 134 mm in total length and 18 to 38 grams in weight. Females are heavier than males. The fur of Hoary Bats is yellowish-brown to dark mahogany brown, each hair tipped with silver.

### Distribution and Abundance

Data on specific locations of Hoary Bat are not recorded by NHESP. Hoary Bats do not hibernate in Massachusetts; they are only known from the state during the summer and migration. In large part, Hoary Bats only migrate through Massachusetts; apparently, few individuals spend the summer. There are two recent breeding records (Cardoza et al. in prep.). As for Silver-haired Bat, it is mostly female Hoary Bats that migrate. Thus, it is likely that most Hoary Bats found in Massachusetts are females or young of the year of both sexes. Cardoza et al. (in prep.) found records of Hoary Bats in 25 of 351 municipalities, from 12 of the 14 counties.

### Habitat Description

Hoary Bats are forest-dwellers, but can be seen hunting over water or at lights. They roost solitarily among thick leaves of trees or in cavities or buildings.

### Threats

As for most bats, Hoary Bats are threatened by the precipitous decline in larger moths due to parasitism by *Compsilura*. Other threats include declines in other prey species, due to insecticide spraying or prey species habitat destruction, and outright destruction of bat habitat, due to conversion to development, intensive logging, or agriculture.

### Reference

Cardoza, J. E., G. S. Jones, and T. W. French. In prep. Distribution and status of bats in Massachusetts, USA.

Whitaker, J. O., Jr., and W. J. Hamilton, Jr. 1998. *Mammals of the Eastern United States*. Third edition. Comstock Publishing Associates, Ithaca, New York.

## Bobcat (*Lynx rufus*, no state or federal status)

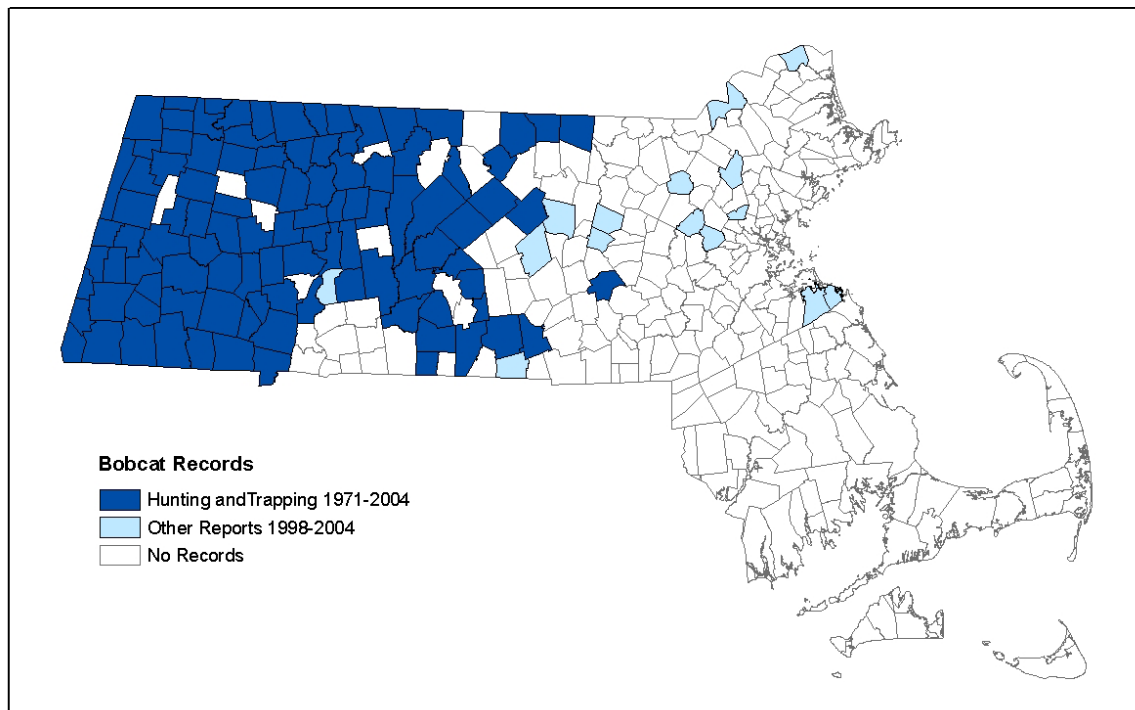
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S4	Large Unfragmented Landscape Mosaic	Large Home Range

### Species Description

Bobcats are medium-sized feline carnivores with a short tail, tufted ears, a facial ruff, rather small head, and long legs relative to body length. They have short, dense fur occurring in a variety of color patterns, but typically yellowish or reddish on the upper parts and white with black spots underneath. The tail has stripes or bands only on the upper surface. The feet have functional toes with sharp, retractile claws. Adult males weigh 6 to 18 kg and adult females 4 to 15 kg.

### Distribution and Abundance

Bobcats are common in western and central Massachusetts, occasional in northeastern Massachusetts, and rare or absent in the southeastern counties. There are no reliable or accurate means of attaining population estimates for Bobcats.



Massachusetts Towns with Recent Occurrences (1971-2004) of Bobcat

### Habitat Description

In North America, bobcats occupy a wide range of habitats from boreal forests to deserts, and rocky mountains to humid bottomlands. However, they typically prefer rugged country interspersed with dense cover supporting an abundance of medium-sized prey and which allows hunting by ambush or stalking. Typical bobcat habitat in western Massachusetts includes regenerating forest, small hardwood stands, and other early successional habitats. In winter, bobcat also often select cliffs and dense stands of spruce or hemlock-hardwoods. These choices undoubtedly reflect availability of and access to prey. Dense understory vegetation and rocky ledges are important structural components of bobcat habitat.

## Threats

Bobcats may be threatened by: (1) changes in habitat quantity and quality; (2) human-induced mortality; (3) interspecific competition; and (4) the impact of parasites and diseases. The key management needs for bobcat include: (1) development and implementation of accurate survey or census techniques; (2) protection or improvements of habitat for bobcat and prey species; (3) refinements in harvest management to better match variations in abundance in space and time; (4) improving public knowledge and support for management options; (5) evaluating the effectiveness and need for federal oversight; and (6) understanding and monitoring the impact of diseases and parasites. Long-term studies are essential to most of these needs.

## References

Anderson, E.M., and M.J. Lovallo. 2003. Bobcat and lynx. Pages 758-786 in G.A. Feldhamer, B.C. Thompson, and J.A. Chapman (eds.) *Wild Mammals of North America: Biology, Management, and Conservation*. Johns Hopkins University Press, Baltimore, Maryland.

Berendzen, S.L. 1985. Ecology and status of the bobcat in western Massachusetts. M.S. thesis, University of Massachusetts, Amherst, Massachusetts, 95pp.

Woolf, A., and G.F. Hubert, Jr. 1998. Status and management of bobcats in the United States over three decades: 1970's – 1990's. *Wildlife Society Bulletin* 26: 287-294.

## Beach Vole (*Microtus breweri*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G1Q	S1	Coastal Dunes/ Beaches/ Small Islands	Globally Rare

### Species Description

The Beach Vole is an island relative of the common Meadow Vole, *Microtus pennsylvanicus* and has variously been considered a subspecies (*Microtus pennsylvanicus breweri*) or a distinct species. It is said to differ from the Meadow Vole by averaging larger in size being much paler in color, and by having fewer closed triangles in the pattern of the upper molars.

### Distribution and Abundance

The Beach Vole is restricted to Muskeget Island which is located 6 miles off the northwest end of Nantucket Island, Nantucket County, Massachusetts. If this population of voles is indeed recognized as a valid species, it represents the only vertebrate species endemic to Massachusetts. Muskeget Island is a low sandy island that is only 0.6 square miles in size. This vole is said to have also historically occurred on nearby Adam's Island and South Point Island.

### Habitat Description

Muskeget Island is a low, mostly treeless island dominated by grasses, with areas of bayberry and beach plum. Poison ivy is abundant over portions of the island. Muskeget historically hosted an extensive tern colony and now supports nesting Herring and Great Black-backed Gulls, with a small number of terns nesting on one end along the beach. Muskeget is also the site of the southern-most pupping site for Gray Seals anywhere in their range. On January 20, 2000, a total of 633 Gray Seal pups were counted on the island.

### Threats

Since the highest point on the island is only 15 feet above the high tide line, Beach Voles are vulnerable to any significant rise in seal level and to storm surge. Beach Voles are also known to experience natural population cycles and may be more vulnerable to extinction during periods of population decline. Known predators include Short-eared Owl (state Endangered) and Northern Harrier (state Threatened).

### Reference

Tamarin, R. H., and T. H. Kunz. 1974. *Microtus breweri*. *Mammalian Species* No. 45: 1-3. Amer. Soc. Mammalogists.

## Harbor Porpoise (*Phocoena phocoena*, no state or federal status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4G5	S4	Marine & Estuarine Habitats	NE F&W Agencies

### Species Description

The Harbor Porpoise is our smallest cetacean with an average adult size of about 4.5 feet (1.4 m) in length and a weight of about 90 pounds (41 kg). They are small but stout and lack the beak typical of most dolphins. The dorsal fin is low with a broad base and roughly triangular with a slightly concave trailing edge. They are dark gray, almost black dorsally, with a light-colored ventral surface. They have 22 to 28 spatulate-shaped teeth on each side of both jaws. No other New England cetacean has flattened teeth. At sea, they appear very small and dark as they slowly roll over at the surface as they breathe. They are typically seen singly or in pairs, but may occasionally travel in small loose groups.

### Distribution and Abundance

Harbor Porpoises occur from North Carolina to Greenland. They are relatively common in Massachusetts coastal waters from about March through November, but apparently move off shore during the winter. The entire Gulf of Maine supports an estimated 89,700 individuals, but only a small portion of this population uses Massachusetts waters.

### Habitat Description

Harbor Porpoises spend most of their time in relatively shallow water, coming into bays and harbors and even into estuaries at the mouths of larger rivers. When offshore, they are usually found over shallow areas such as Georges Bank and Jeffrey's Ledge. They follow schools of herring, mackerel, pollock, and squid.

### Threats

By far, the greatest threat to Harbor Porpoises off the Massachusetts coast is entanglement in sink gill nets. Between 1990 and 1996, the number of Harbor Porpoises believed to have drowned in sink gill nets within the Gulf of Maine ranged from 1,000 to 3,000 per year. More recent restrictions on the use of this gear in waters under state and federal jurisdiction have reduced the rate of gear-related mortality. Exposure to environmental pollutants such as mercury may also be a threat, but contaminant levels have not been adequately documented in our waters.

### References

- Gaskin, D. E. 1999. Harbor Porpoise, *Phocoena phocoena*. Pp. 295-296 in D. E. Wilson and S. Ruff. (eds.). North American Mammals. Smithsonian Institution.
- Gaskin, D. E., P. W. Arnold, and B. A. Blair. 1974. *Phocoena phocoena*. *Mammalian Species* 42: 1-8. Amer. Soc. Mammalogists.
- Marine Mammal Commission. 2001. Gulf of Maine Harbor Porpoise. Pp. 33-41 in Annual Report to Congress 2000. 253 pp.

## New England Cottontail (*Sylvilagus transitionalis*, no state or federal status)

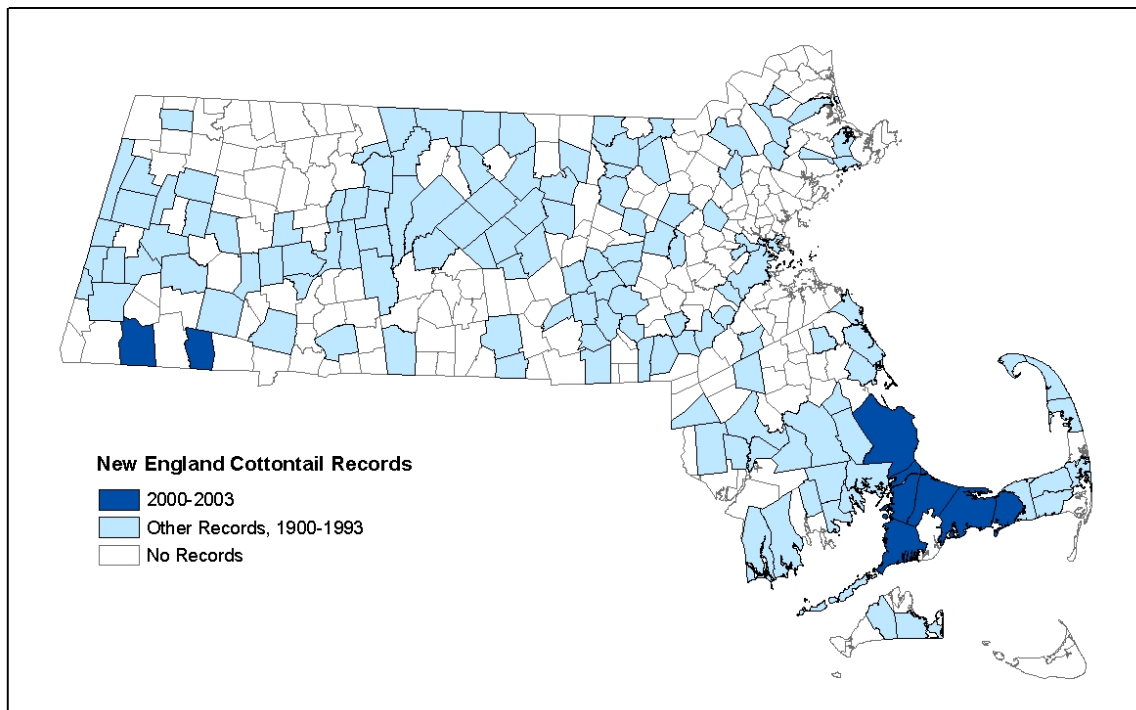
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S4	Young Forests & Shrublands	NE F&W Agencies

### Species Description.

The New England Cottontail is a medium-sized cottontail rabbit with dark-brown to buffy upper parts overlain with distinct black guard hairs. Its ears are short and rounded, with the anterior portion edged in black, and there is a black spot between the ears. Cranial characters, including an irregular suture between the frontals and nasals, and a long slender postorbital process (rarely touching the skull), can reliably distinguish this cottontail from the Eastern Cottontail (*S. floridanus*). New England Cottontails may weigh 1 kg and measure 390 to 430 mm in length.

### Distribution and Abundance.

The New England Cottontail was once found statewide in Massachusetts, including in Dukes and Nantucket counties, from which it had vanished by the 1920s. New England Cottontails maintained an overall relative abundance of about 22% of all cottontail specimens obtained during 4 surveys between 1950-1993. However, in the 1990-93 survey, Eastern Cottontails were found in 13 of 14 counties, while *S. transitionalis* was found in only 6. In 2000-2003, no New England Cottontails were found among 183 specimens received from cooperators. However, small populations were reported in Barnstable County and southern Berkshire County by another researcher.



Massachusetts Towns with Recent (2000-2003) and Historical (1900-1993) Occurrences of New England Cottontail

### Habitat Description

The New England Cottontail is an early successional or thicket-dwelling species. Suitable habitat can be found in both forests and shrublands, where there is a dense understory with food and cover in close association. Typical

habitats include native shrub associations, beaver flowages, old fields and pastures, and early successional forests. It may also be found in laurel thickets.

### **Threats**

The widespread loss of early successional habitat types is the proximate threat to the New England Cottontail. Residential and commercial development in pitch pine-scrub oak barrens or other early successional communities has also fragmented, degraded, or eradicated habitat for *S. transitionalis*. Fragmentation and diminishment of suitable habitat patches reduces suitable foods, provides less escape cover, and forces New England Cottontails to forage at greater distances than in ideal habitat. Increases in generalist carnivores affect both cottontail species; however, Eastern Cottontails have the ability to forage further from cover and to detect predators at greater distances than do New Englands. New England Cottontails may also be unable to compete with and displace the more adaptable Eastern Cottontail from suitable habitats.

### **References**

- Litvaitis, J.A. 1993. Response of early successional vertebrates to historic changes in land use. *Conservation Biology* 7: 866-873.
- Litvaitis, J.A., M.N. Marchand, J.P. Tash, M. Oberkrieser, V. Johnson, and M.K. Litvaitis. 2003. Interim progress report II: a regional inventory of New England cottontails. Departments of Natural Resources and Zoology, University of New Hampshire, Durham, New Hampshire, 37pp.
- Smith, D.F., and J.A. Litvaitis. 2000. Foraging strategies of sympatric lagomorphs: implications for differential success in fragmented landscapes. *Canadian Journal of Zoology* 78: 2134-2141.



## Black Bear (*Ursus americanus*, no state or federal status)

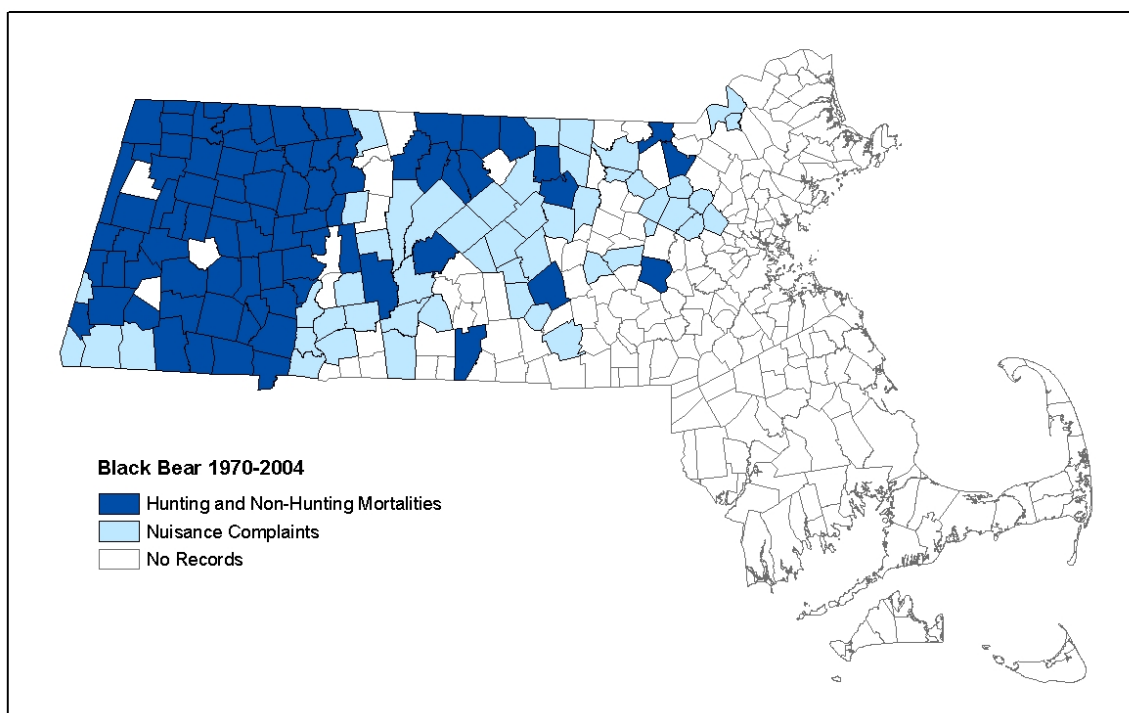
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S4	Large Unfragmented Landscape Mosaic	Large Home Range

### Species Description

Black bears are stocky and large-bodied with sturdy legs and flat, 5-clawed feet and coarse, shaggy pelage. Black bears have small eyes, small rounded ears and a short tail. Although they may be brown or cinnamon-colored in open western habitats, almost all black bears in eastern deciduous forest are entirely black except for a brown muzzle and occasionally a white chest patch. Black bears range from 100 to 250 kg for adult males and 50 to 100 kg for adult females. Body length ranges from 1 to 2 m.

### Distribution and Abundance

Black bears are found in all towns west of the Connecticut River and are moderately common in the area from the Connecticut River through central and northern Worcester County. Occasional vagrants occur in northeastern Massachusetts. Bears are absent from southeastern Massachusetts. In 1998, there were an estimated 1750-1800 bears in Massachusetts, with the population increasing at about 8% annually.



Massachusetts Towns with Recent Occurrences (1970-2004) of Black Bear

### Habitat Description

Black bears are forest animals. However, they have the ability to exploit a wide array of physiographic and vegetative associations. These may vary in climate, soils, and topography, which consequently affect the quantity, quality, and availability of food, which is the primary determinant of black bear home range size, movements, and habitat use. Suitable black bear habitat is characterized by mature forest interspersed with small openings and tracts of early successional forest. The eastern deciduous forests, with their abundance and variety of foods—including acorns and other nut crops—yield the greatest black bear growth rates. In Massachusetts, wetlands are important to

black bears in spring and summer, early successional and berry-producing areas in summer, and hardwood ridges in autumn.

### **Threats**

Although the black bear is the least threatened of the eight bear species and is stable or increasing in most of its range, it faces both short-term and long-term threats to its survival. Habitat fragmentation poses a serious risk to species (such as the black bear) with large home ranges and a sexually selected dispersal pattern. The consequent introgression of these large carnivores into human-dominated landscapes poses substantial ecological and conservation challenges. Alterations to bear habitat may degrade or modify the food biomass available to bear and coincidentally induce changes in bears' tolerance to humans, and that of humans to bears. Alterations to landscape mosaics, disruption of climatic cycles, rises in pollutant levels, draining of wetlands and waterways, and the proliferation of anthropogenic food sources will all affect the ability of the landscape to sustain black bears.

### **References**

Fuller, D.P. 1993. Black bear population dynamics in western Massachusetts. M.S. thesis, University of Massachusetts, Amherst, 136pp.

Pelton, M.R. 2003. Black bear. Pages 547-555 in G.A. Feldhamer, B.C. Thompson, and J.A. Chapman (eds.). *Wild Mammals of North America: Biology, Management, and Conservation*. Johns Hopkins University Press, Baltimore, Maryland.

Servheen, C., S. Herrero, and B. Peyton (compilers). 1999. Bears: status survey and conservation action plan. International Union for the Conservation of Nature and Natural Resources, Gland, Switzerland, 309pp.

## **F. Miscellaneous Invertebrates**

## Smooth Branched Sponge (*Spongilla aspinosa*, State Special Concern)

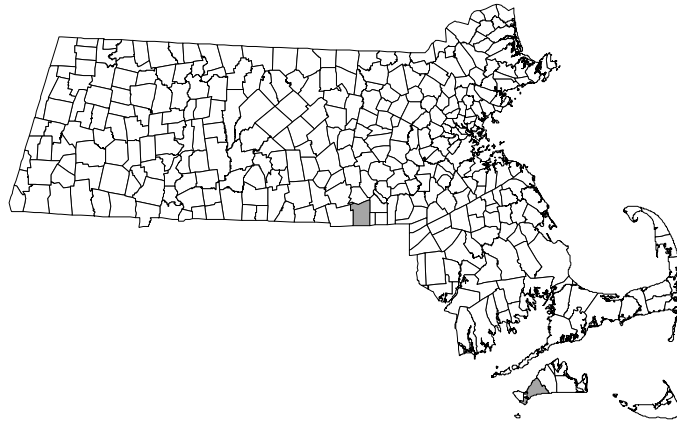
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G2G3	S1	Lakes & Ponds	State List; Globally Rare

### Species Description

The Smooth Branched Sponge is a rare freshwater sponge, distinguished from the common *Spongilla lacustris* by the distribution of gemmules with a sponge and by the absence of gemmoscleres (spicules that reinforce the gemmules).

### Distribution and Abundance

There have been two occurrences of Smooth Branched Sponge documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Smooth Branched Sponge

### Habitat Description

Smooth Branched Sponges are found in only two ponds in Massachusetts. Both ponds are acidic, with a pH of 5.0. In one pond, the sponge is found exposed on rocks along the shore. In the second pond, the sponge was found in the pond near a cleared area.

### Threats

The specific threats to the Smooth Branched Sponge are unknown. However, it can be assumed that alterations to water quality or quantity, in the two ponds where this sponge has been documented, could be detrimental to this species.

### Reference

Smith, D. G. 1992. Proposal to List a Species under the Massachusetts Endangered Species Act: Smooth Branched Sponge, *Spongilla aspinosa*. Unpublished; available at the Massachusetts Natural Heritage & Endangered Species Program, Westborough, MA.

## Mt. Everett Sponge (*Corvomeyenia everetti*, no state status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S1	Lakes & Ponds	Globally Rare

### Species Description

The Mt. Everett Sponge is filamentous, with long slender branches with few statoblasts. The megascleres are slender, curved slightly, smooth, and sharply pointed (Mills 1884, Smith 2001)

### Distribution and Abundance

The Mt. Everett Sponge was first discovered on Mt. Everett in Mt. Washington, Massachusetts. Recent collections suggest it may be more widespread but local in the state than was thought 10 years ago.

### Habitat Description

The Mt. Everett Sponge inhabits acidic ponds and lakes with low concentrations of calcium, though some calcium is essential (Smith 2001).

### Threats

Hydrological alterations in either quantity or quality are potential threats to this sponge.

### References

Mills, H. 1884. Thoughts on the Spongidae. *Proc. Amer. Soc. Microscopists* 131-147.

Smith, D.G. 2001. *Pennak's freshwater invertebrates of the United States: Porifera to Crustacea*. 4<sup>th</sup> edition. John Wiley & Sons N.Y., N.Y.

## Sunderland Spring Planarian (*Polycelis remota*, State Endangered)

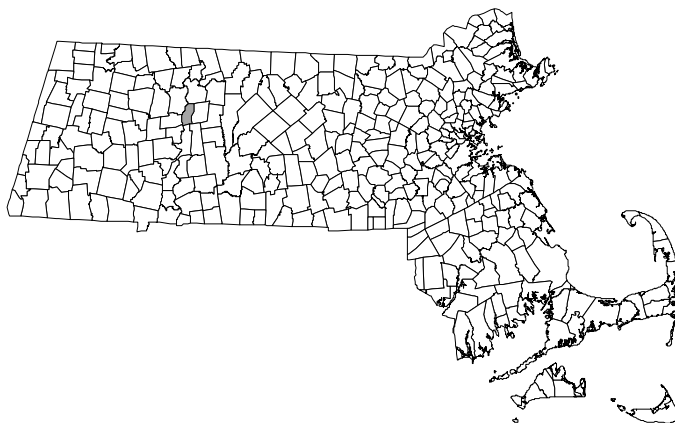
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G1	S1	Springs, Caves & Mines	State List; Globally Rare

### Species Description

The Sunderland Spring Planarian is a free-living, freshwater flatworm (Smith 2001). Like other freshwater flatworms, it is long and flat, but the Sunderland Spring Planarian can be distinguished by its several small eyes tightly arranged in an arc along the front end of its body. This species is uniformly pigmented on its back, ranging in color from light olive in smaller specimens to reddish brown in larger specimens. The underside is grayish-white in color. Mature specimens range from 10 to 17 mm in length (Smith 1988).

### Distribution and Abundance

There has been one occurrence of Sunderland Spring Planarian documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Sunderland Spring Planarian

### Habitat Description

The Sunderland Spring Planarian is restricted to a cold spring in Sunderland, Massachusetts. This spring has water temperatures of 8.5 to 9.0 degrees Celsius throughout the year. The greatest concentration of this planarian can be found living in the spring, but some animals are found just downstream of the spring on the undersides of stones and cobbles.

### Threats

Pollution from development and gravel excavation operations near the spring site is a possible threat to this species. Any changes in water quality within the narrow habitat of this species could also pose a threat.

### References

Smith, D. G. 1988. A new, disjunct species of Triclad flatworm (Turbellaria: Tricladida) from a spring in southern New England. *Biol. Bull.* 175: 246-252.

Smith, D. G. 2001. *Pennak's freshwater invertebrates of the United States: Porifera to Crustacea*. Wiley and Sons, Inc., New York.

## New England Medicinal Leech (*Macrobdella sestertia*, State Special Concern)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G2	S1	Lakes & Ponds	State List; Globally Rare

### Species Description

Though unsavory to some, the New England Medicinal Leech is one of the rarest species of leech in North America. It is also one of the largest leeches found in New England, reaching a length of 150 mm, or greater than 5 inches. It is flat and bright green in color, with 20 or more reddish orange spots along its dorsal surface (Sawyer 1986). This species is a sanguivorous (bloodsucking) leech, having a medium to large mouth with 38 to 48 teeth on each of its toothed jaws. Five pairs of eyes form a distinctive arch along the front end of the animal.

The life history and behavior of the New England Medicinal Leech is essentially unknown. It is presumed to be similar to the American Medicinal Leech (*M. decora*), a closely related, more common, and widespread sanguivorous leech. Peak activity periods of this leech are during the spring and early summer. It is found in warm protected shallow areas of ponds with little wave action. It stays concealed during the day in dark places provided by vegetation, stones, and debris, and is most active at night (Moore 1923). It moves along the pond bottom with movements like that of inchworms, and can swim using up-and-down and side-to-side movements of its body. As a sanguivorous leech, it attaches to vertebrates that enter the water.

### Distribution and Abundance

There have been no occurrences of New England Medicinal Leech documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). Until the early 1990s it was thought that the New England Medicinal Leech was endemic to the coastal freshwaters of Massachusetts. Since its discovery in Maine in 1993, the distribution of this species remains unclear, but is likely very restricted. It can probably be found in freshwater habitats of the coastal regions of New England associated with past glacial activity during the Pleistocene Epoch (Smith 1977). New England Medicinal Leech has been recorded only three times in Massachusetts: in Cambridge sometime between 1870 and 1886; in Hamilton in 1976; and in Harwich in 1977. Apparently there have been no searches for this species in Hamilton or Harwich since the 1970s.

### Habitat Description

The New England Medicinal Leech inhabits the shallow waters of the shoreline. Early specimens were found in the detritus of a vegetated area along the shores of a coastal kettlehole that was characterized by dark, naturally tea-colored waters. However, it has since been recorded from a pristine, clear, low-nutrient lake in inland Maine (Smith and Hanlon 1997).

### Threats

The New England Medicinal Leech is found in natural ponds with abundant bordering vegetation, and so is likely sensitive to shoreline changes and declines in water quality. The filling of ponds or the seeping of sewage into vegetated ponds and streams both pose potential threats to this species.

### References

- Moore, J. P. 1923. The control of bloodsucking leeches, with an account of the leeches of Palisades Interstate Park. *Roosevelt Wild Life Bulletin* 2: 1-53.
- Sawyer, R. T. 1986. *Leech biology and behavior. Volume II. Feeding biology, ecology, and systematics*. Oxford University Press, Oxford, England. pp 419-793.
- Smith, D. G. 1977. The rediscovery of *Macrobdella sestertia* Whitman (Hirudinea: Hirudinidae). *J. Parasitol.* 63: 759-760.
- Smith, D. G., and S. Hanlon. 1997. *Macrobdella sestertia* (Hirudinea: Hirudinidae) in Maine and a key to the Hirudiniiform leeches of Maine. *Northeastern Naturalist* 4 (4): 231:236.

## Lawrence Sallfly (*Alloperla voinae*, no state status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	SNR	Large & Mid-sized Rivers, Small Streams	Globally Rare

### Species Description

Stoneflies have a larval aquatic stage and a terrestrial adult stage. The larvae are typically robust and brown. Stonefly nymphs have two caudal appendages, as opposed to the mayflies, which have three. Adult stoneflies are winged, and fold their wings over their backs when at rest. Adult Lawrence Sallflies are green stoneflies 8 to 10 mm in length. The larva of the Lawrence Sallfly is undescribed.

### Distribution and Abundance

The Lawrence Sallfly is known from Maine, Massachusetts, New York, and Vermont, as well as Nova Scotia and Quebec. The locations of Massachusetts occurrences have not been determined at this time.

### Habitat Description

The larval habitat is unknown, although most stonefly larvae live in moving water, with the exception of a few species that inhabit cool lentic waters. Adults of this species have been found in streamside vegetation during early summer, suggesting that the larvae are stream dwellers (Hitchcock 1974).

### Threats

As larval habitat is not known, it is not possible to provide a list of specific threats. However, alteration of stream flow, deforestation and subsequent changes in water temperature and clarity, and pollution are likely threats.

### Reference

Hitchcock, S. W. 1974. Guide to the Insects of Connecticut: Part VII. The Plecoptera or Stoneflies of Connecticut. State Geological and Natural History Survey of Connecticut, Department of Environmental Protection. Bulletin #107.



## Hanson's Appalachian Stonefly (*Hansonoperla appalachia*, no state status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	SNR	Large & Mid-sized Rivers, Small Streams	Globally Rare

### Species Description

Stoneflies have a larval aquatic stage and a terrestrial adult stage. The larvae are typically robust and brown; Hanson's Appalachian Stonefly larvae are 10 to 14 mm long and patterned with dark brown. Stonefly nymphs have two caudal appendages, as opposed to the mayflies, which have three. Adult stoneflies are winged and fold their wings over their backs when at rest.

### Distribution and Abundance

This species is known from New Hampshire to North Carolina. The locations of Massachusetts occurrences have not been determined at this time.

### Habitat Description

Hanson's Appalachian Stoneflies inhabit clear, medium-sized streams in the high Appalachians from New Hampshire to North Carolina. Pre-emergent nymphs have been found associated with roots and detritus in undercut stream banks (Stewart and Stark 2002).

### Threats

Alteration of stream flow, deforestation and subsequent changes in water temperature and clarity, and pollution are likely threats.

### Reference

Stewart, K. W., and B. P. Stark. 2002. *Nymphs of North American Stonefly Genera (Plecoptera)*, 2<sup>nd</sup> edition. The Caddis Press, Columbus, Ohio.

## A Stonefly (*Perlesta nitida*, no state status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	SNR	Large & Mid-sized Rivers, Small Streams	Globally Rare

### Species Description

NatureServe states that “*Perlesta nitida* can be readily separated from other species with the penis having a prominent thumb-like caecum and long whip-like ventral extension (*Perlesta decipiens*, *Perlesta shubuta*, and *Perlesta cinctipes*). The knob-like caecum of *P. nitida* is considerably reduced in size, and the paraprocts are short, broad, and bear a mecially-produced tooth. The nymph remains undescribed...”

### Distribution and Abundance

The complete distribution of this species is unknown, but it is apparently widespread from New England to Pennsylvania, West Virginia, and Ohio south to Florida.

### Habitat Description

Larval habitat is unknown, although most stonefly larvae live in moving water, with some in cool lentic water.

### Threats

As larval habitat is not known, it is not possible to provide a list of specific threats. However, habitat degradation is a certain threat, including alteration to flow and practices that increase water temperature and siltation, such as clearing to the edge of the stream.

### Reference

NatureServe. 2005. NatureServe Explorer: An online encyclopedia of life [web application]. Version 4.4. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

## **G. Snails**

## New England Siltsnail (*Cincinnatia winkleyi*, State Special Concern)

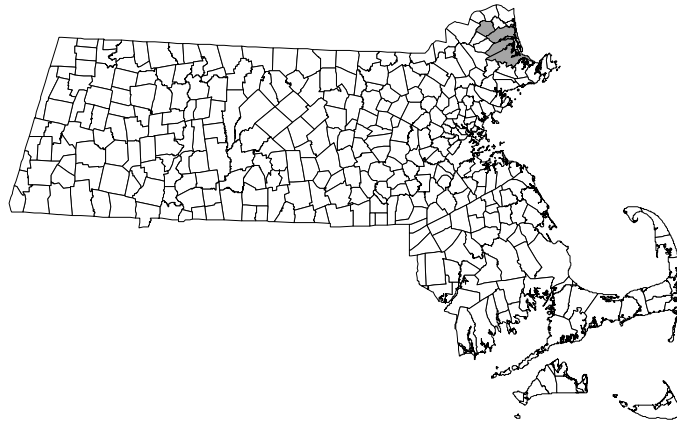
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S1	Salt Marsh	State List; Globally Rare

### Species Description

The New England Siltsnail is a relatively small snail with a broadly conical shell. The spiral shell has 4.5 to 5 strongly convex whorls. It has a glossy sheen and is whitish in color when cleaned (Pilsbry 1912). The average size for adults is 4.8 mm long and 3.1 mm in diameter. Like all snails of the subclass Prosobranchia, the New England Siltsnail has a hardened circular structure, known as an operculum, which acts as a trap door at the shell opening. The operculum has a single obvious spiral that fans out to the perimeter.

### Distribution and Abundance

There have been six occurrences of New England Siltsnail documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of New England Siltsnail

### Habitat Description

Look for the New England Siltsnail in coastal waters that are fresh or contain a trace of salt. Habitats include pools, creeks, marshes, and banks exposed at low tides. This snail is often found on top of mud banks waiting for water from the rising tides to cover it. It is also found on rocks and emergent vegetation beneath the water. In Massachusetts, a ditch with cattails and rushes draining an oak-alder-pine swamp supports one population. Another population has been found in streams with tidal influences flowing out of a partially impounded cattail marsh (mixed *Typha angustifolia* and *T. latifolia*). Elsewhere, this snail has been found in isolated tidal pools with high salinities and in association with the Saltmarsh Hydrobe Snail (*Spurwinkia salsa*). It has also been found in brackish tidal marshes dominated by cattails with patches of Fresh Water Cordgrass (*Spartina pectinata*) and Soft-stem Bulrush (*Scirpus validus*). Although this species can be found in brackish waters (salinity of 0.5 to 3.0 parts per thousand), it also occurs in fresh waters.

### Threats

Unregulated development adjacent to the drainage systems that contain this species is a potential threat, as is a change in hydrology or the leaching of toxic substances into the snail's habitat.

### Reference

Pilsbry, H.A. 1912. A new species of Amnicola. *The Nautilus* 26 (1):1.

## Walker's Limpet (*Ferrissia walkeri*, State Special Concern)

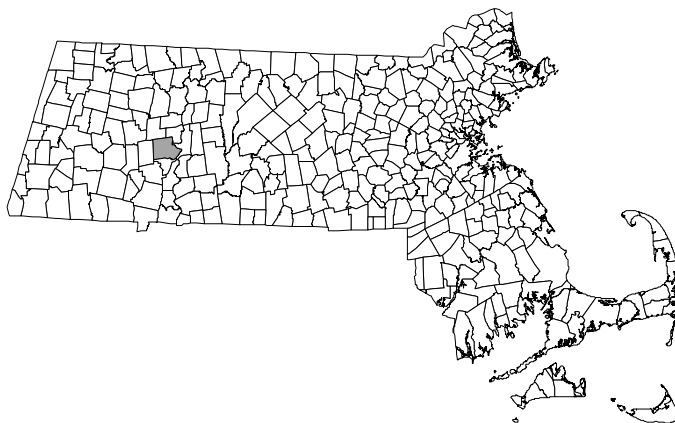
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4G5	S3	Lakes & Ponds, Large & Mid-sized Rivers	State List

### Species Description

Walker's Limpet is a very small freshwater limpet, up to 6 mm long and 1.4 mm high. The single shell is thin, fragile, oval, and high-peaked, with tiny, dense, concentric striations and faint radial striations (Basch 1963, Smith 1974).

### Distribution and Abundance

There has been one occurrence of Walker's Limpet documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Walker's Limpet

### Habitat Description

Within the past 25 years, Walker's Limpet has been found only in the smaller impoundments and backwaters of the lower stretch of one river system in western Massachusetts. Generally, these limpets are attached to aquatic plants, rocks, and detritus, over muddy bottoms (Smith 1974). In 1975 and 1976, Walker's Limpet was collected from two clear, soft-water ponds on Cape Cod (Jokinen 1978). These Cape Cod ponds had no other snail species present, but the Mill River sites had two other common snail species associated with the collection sites.

### Threats

The threats specific to Walker's Limpet are unknown; however, changes in water quality or quantity, alteration in predator cohorts, changes in food supply, or habitat destruction can be presumed to have deleterious impacts on this species.

### References

Basch, P.F. 1963. A review of the recent freshwater limpet snails of North America (Mollusca: Pulmonata). *Bulletin of the Museum of Comparative Zoology* 129(8).

Jokinen, E. 1978. Habitats of two freshwater limpets (*Ferrissia*: Ancyliidae) from New England. *The Nautilus* 92: 156-160.

Smith, D. 1974. The Mollusca of the Mill River System: Its Systematics, Ecology, and Recent Distribution. Unpublished thesis, University of Massachusetts, Amherst, Massachusetts.

## Coastal Marsh Snail (*Littoridinops tenuipes*, State Special Concern)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Salt Marsh	State List

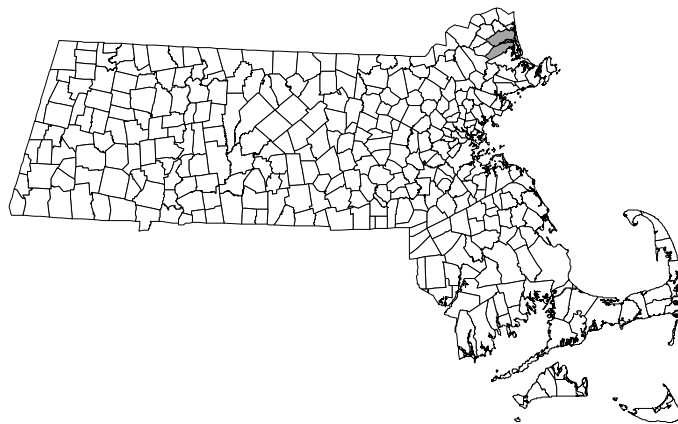
### Species Description

The Coastal Marsh Snail, also known as Henscomb Hydrobe, is a small snail with an average shell length of 4 mm. Its spiral shell is generally thin and transparent, but can be thicker and more opaque in larger specimens. The shell appears glossy and light brown or olivaceous in color with nearly 5 relatively flat-sided whorls (Pilsbry 1952). As with all species of the subclass Prosobranchia, the Coastal Marsh Snail has a hardened circular structure, known as an operculum, which acts as a trap door at the shell opening. The operculum of this species is characteristically thin and transparent and has a single spiral that fans out to the perimeter of the operculum.

Little is known about the life history of the Coastal Marsh Snail. Adults are found in summer and probably live 2 to 3 years (D.G. Smith, personal communication 2003). Snails in this family (Hydrobiidae) are browsers, consuming fine particulate matter or rasping diatoms and other microorganisms from firm surfaces. This species has separate sexes and fertilization takes place internally (Taylor 1966). Eggs are deposited by the female and are enclosed in a protective capsule.

### Distribution and Abundance

There have been two occurrences of Coastal Marsh Snail documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). In Massachusetts, the Coastal Marsh Snail is at its northern range limit. Elsewhere, its range is widespread to the south along the Atlantic seaboard.



Massachusetts Towns with Recent Occurrences of Coastal Marsh Snail

### Habitat Description

Look for the Coastal Marsh Snail in coastal waters that are fresh or contain a trace of salt. In Massachusetts, this snail has been found in a ditch containing cattails (*Typha* spp.) and rushes that drains an oak-alder-pine swamp. Here, the Coastal Marsh Snail was found in association with the New England Siltsnail (*Cincinnatia winkeyi*) and the Saltmarsh Hydrobe (*Spurwinkia salsa*). The Coastal Marsh Snail was found in another location close to a tidal marsh that was dominated by cattails and influenced by tidal waters. Associated species at this site were the New England Siltsnail, the freshwater Ubiquitous Peaclam (*Pisidium casertanum*), and pulmonate snails from the genus *Lymnaea*. Elsewhere, this species is known from streams and ditches with little or no water current and is usually found on hard sand beds (Thompson 1968).

### **Threats**

Unregulated development adjacent to the drainage systems containing this species is a potential threat, as is a change in hydrology or the leaching of toxic substances into the snail's habitat.

### **References**

Pilsbry, H. S. 1952. *Littoridina tenuipes* (Couper). *Nautilus* 66:50-54.

Taylor, D. W. 1966. A remarkable snail fauna from Coahuila, Mexico. *Veliger* 9: 152-228.

Thompson, F. G. 1968. *The Aquatic Snails of the Family Hydrobiidae of Peninsular Florida*. University of Florida Press. Gainesville, Florida.

## Slender Walker (*Pomatiopsis lapidaria*, State Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Small Streams, Large & Mid-sized Rivers	State List

### Species Description

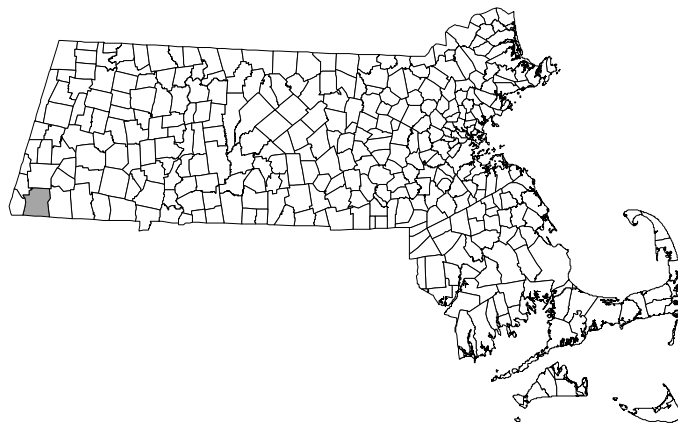
The Slender Walker is an amphibious snail found on land and in freshwater. It has an elongated conical shell reaching nearly 8 mm in length. As with all snails in the subclass Prosobranchia, the shell has an operculum, a hardened circular structure that seals the shell opening. The Slender Walker's operculum has a single obvious spiral, which fans out to the perimeter. The spiral shells of males usually have a higher number of whorls and tend to be more slender than females.

The life span for the Slender Walker is approximately 2 and a half years (Dundee 1957). There are two reproductive periods between mid-March and October. The eggs are typically laid individually on moist soil at the water's edge and are surrounded by a sandy husk made up of soil and fecal pellets. Young snails emerge after a few weeks by creating a hole in the egg capsule and husk and then crawling through it. The young are seen throughout the summer in colonies ranging from a few dozen to many thousands of individuals.

If there is insufficient moisture, the snail will enter a dormant period when it becomes inactive and its operculum is tightly closed. There are two major dormancy periods in the yearly cycle, but neither period is continuous. A few days of rain may provide enough moisture so that the snail becomes temporarily active again. This species may be found lying in vegetation and under objects during dormancy in the cold, winter months. In the hot, dry months of summer it can be found on the surface of the substrate. Given that the Slender Walker prefers shade and is found under cover on sunny days suggests that dormancy ensues somewhat immediately when there is lack of sufficient moisture (Dundee 1957).

### Distribution and Abundance

There has been one occurrence of Slender Walker documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). In a recent field survey, the Slender Walker was common in one very distinct habitat along the brook where it is known to occur, but was not found in any other area in that brook or in the adjacent wetland habitat of nearby brooks (McLain 2003). Elsewhere, this species has a spotty distribution of locally abundant individuals from Northern Florida north to southern Canada, and west through the Great Lakes into Minnesota and south into Arkansas.



Massachusetts Towns with Recent Occurrences of Slender Walker



## **Habitat Description**

In Massachusetts, the Slender Walker has been found in the low, moist bordering floodplain of Schenob Brook, a slow-flowing, calcareous brook. Sensitive Fern (*Onoclea sensibilis*) dominates the area where snail colonies are found. The Slender Walker is found along riverbanks or in moist areas near streams in vegetation that is well protected from direct sunlight. While the Slender Walker requires very moist conditions, it is not found submerged in water for long periods of time except during wet conditions, such as rain events. During these events, this species can be submerged for several days. On sunny days, the snail can be found under leaves in the shade or on cloudy days it may be easily visible. It is usually found on substrates that have a high proportion of sand and dead plant material.

## **Threats**

It is unclear what factors may influence the distribution of the Slender Walker. The greatest threat is likely to be habitat destruction or alteration.

## **Reference**

Dundee, D. S. 1957. Aspects of the biology of *Pomatiopsis lapidaria* (Say) (Mollusca: Gastropoda: Prosobranchia). *Misc. Publ. Mus. Zool. Univ. Michigan*. No. 100:1-37, 16 pls.

McLain, D. 2003. Status of 4 state-listed snails in western Massachusetts in 2002. A report to the Massachusetts Natural Heritage and Endangered Species Program.

## Pilsbry's Spire Snail (*Pyrgulopsis lustrica*, State Endangered)

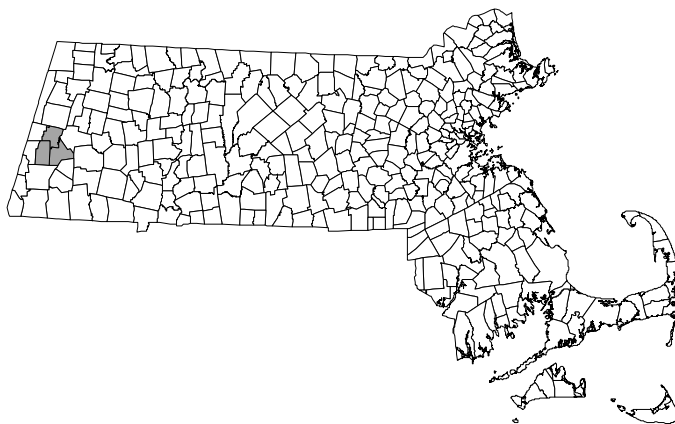
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Lakes & Ponds	State List

### Species Description

The Pilsbry's Spire Snail, also known as the Boreal Marstonia, is a small snail that has a translucent shell with a light greenish or brownish color. The spiral shell is conical and thin, approximately 3 to 5 mm high, and has 4.5 to 6 whorls (Hershler 1994). As with all snails of the subclass Prosobranchia, the Pilsbry's Spire Snail has a hardened circular structure, known as an operculum, which acts as a trap door at the shell opening. The operculum has a single obvious spiral that fans out to the perimeter.

### Distribution and Abundance

There has been one occurrence of Pilsbry's Spire Snail documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). The Pilsbry's Spire Snail is found at the eastern edge of its range in western Massachusetts. This species also occurs in New York, Pennsylvania, and southern Ontario west to states in the Great Lakes region and south to northern parts of the Mississippi River drainage.



Massachusetts Towns with Recent Occurrences of Pilsbry's Spire Snail

### Habitat Description

The Pilsbry's Spire Snail lives in rivers and lakes and can be found on rocks and on submerged aquatic vegetation, such as *Vallisneria*, *Potamogeton*, and *Chara* spp. (Jokinen 1992). In Massachusetts, the Pilsbry's Spire Snail has been found on vegetation in a eutrophic, hardwater lake (rich in calcium and magnesium) that has an extensive littoral zone. It is not unusual to find this snail in water depths up to 4 meters, but in this lake it was most abundant in the shallow (0 to 2 meters) vegetated zone of *Myriophyllum spicatum* and *Chara* spp. (Ludlam et al 1973). McLain (2003) conducted recent surveys at the historical site and found the Pilsbry's Spire Snail in the shallow, marshy habitat with sand and mud substrates. McLain also found this species near shore in 1 to 2 m of water where the substrate consisted of cobble, sand, gravel, and some silt. The snail was frequently encountered between the shoreline and dense beds of submerged aquatic vegetation (*M. spicatum* and *Potamogeton* spp.). Historically, the only type of vegetation that this snail had been associated with in Massachusetts was *Chara* spp. (D.G. Smith, personal communication 2003).

### Threats

Pilsbry's Spire Snail populations in Massachusetts are limited to only one lake and are threatened by activities such as lakeshore development, aquatic plant mowing, herbicide treatment, and water level drawdowns. The resulting decrease in water clarity can prevent the growth of rooted aquatic vegetation in deeper waters, which may be essential for the survival of the species.

## **References**

Hershler, R. 1994. A review of the North American freshwater snail genus *Pyrgulopsis* (Hydrobiidae). Smithsonian Contributions to Zoology. Number 554: 75-77.

Jokinen, E. H. 1992. The Freshwater Snails (Mollusca: Gastropoda) of New York State. New York State Museum Bulletin 482.

Ludlam, S. D., K. S. Hutchinson, and G. E. Henderson. 1973. The limnology of Stockbridge Bowl, Stockbridge, Massachusetts. University of Massachusetts Water Resources Research Center, Completion Report FY-73-4. 59 pp.

McLain, D. 2003. Status of 4 state-listed snails in Western Massachusetts in 2002. Report to the Massachusetts Natural Heritage and Endangered Species Program.

## Boreal Turret Snail (*Valvata sincera*, State Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Lakes & Ponds	State List

### Species Description

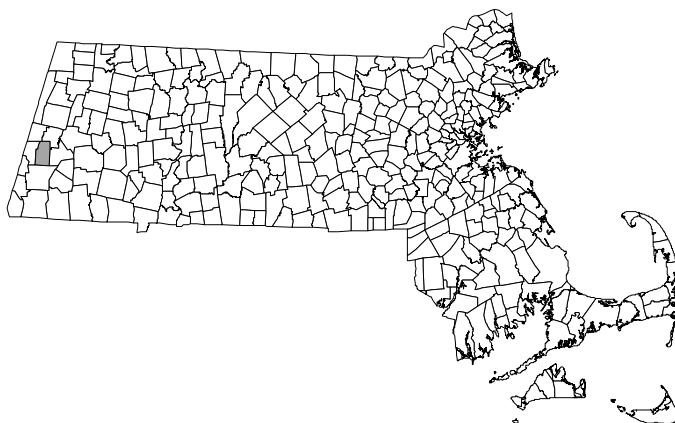
The Boreal Turret Snail, also known as the Mossy Valvata, is a small snail in the family Valvatidae with a shell that measures up to 5 mm in diameter. The shell has no distinctive characteristics. It is yellowish-brown in color with a low spire. As with all snails of the subclass Prosobranchia, the Boreal Turret Snail has an operculum, a hardened circular structure that acts as a trap door at the shell opening. For members of the Valvatidae family, the operculum has a tight inner ring that spirals out to the perimeter.

The Boreal Turret Snail has an annual life cycle, and adults are present only in the summer. They are hermaphroditic (adults contain both male and female reproductive tissue) and eggs are laid throughout the summer. An egg capsule containing two to four eggs in a colorless, egg-white-like substance is deposited and attached on aquatic vegetation. These capsules have also been found attached to other smooth objects such as stones and twigs. The snail embryos develop and nearly fill the space in the capsule. Studies of different species in the genus *Valvata* have shown complete egg development and young hatching in 5 to 18 days (Heard 1963, Lang and Dronen 1970). In some species the egg capsule splits longitudinally releasing the eggs to the substrate where the young eat their way out.

### Distribution and Abundance

There has been one occurrence of Boreal Turret Snail documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). In Massachusetts, the Boreal Turret Snail is at the southern geographical limit of its range and has been found in a lake and a pond in the Housatonic River drainage. There is also one record from a lake in the Sudbury-Assabet-Concord Rivers watershed (Jokinen 1983). The species is more widely distributed farther north with records from the Arctic Circle south to Connecticut and west to Minnesota.

Populations of the Boreal Turret Snail are limited to only a few sites, each threatened by surrounding development. The snail is considered to be locally rare. Its presence in Massachusetts probably represents a glacial relict situation where a few populations were left behind as the animal dispersed northward following glacial retreat (Smith 1984). Recent surveys of historical sites were unable to relocate this species (McLain 2003), suggesting that the Boreal Turret Snail may be extirpated from Massachusetts (D.G. Smith, personal communication 2003). Given that this species is locally rare, more survey work is needed before a conclusion on its current status can be reached.



Massachusetts Towns with Recent Occurrences of Boreal Turret Snail

## Habitat Description

The Boreal Turret Snail is a northern species that lives in cold water and is usually found in high calcium habitats. It is found in oligotrophic large lakes and ponds with water depths greater than 2 meters and is found in association with rooted aquatic vegetation including *Chara* spp. and *Potamogeton* spp. Outside Massachusetts, it has been found in rivers (Clarke 1973) and snails were abundant in eutrophic ponds in Connecticut and New York in association with filamentous algae (Jokinen 1992)

## Threats

Shoreline development, water level drawdowns, lake draining, increased nutrient input, and herbicides are potential threats to this species. The resulting decreases in water clarity can prevent the growth of rooted aquatic vegetation in the deeper waters, which may be essential for the survival of the species.

## References

- Clarke, A. H. 1973. The freshwater molluscs of the Canadian Interior Basin. *Malacologia* 13: 1-509.
- Heard, W. H. 1963. Reproductive features of *Valvata*. *Nautilus* 77: 64-68.
- Jokinen, E. 1983. The freshwater snails of Connecticut. Bulletin Connecticut Geological and Natural History Survey 109: 1-83.
- Jokinen, E. 1992. The Freshwater Snails (Mollusca: Gastropoda) of New York State. New York State Museum Bulletin 482.
- Lang and Dronen 1970. Eggs and attachment sites for *Valvata lewisi*. *Nautilus* 84: 9-12.
- McLain, D. 2003. Status of 4 State-listed Snails in Western Massachusetts in 2002. Report to the Massachusetts Natural Heritage and Endangered Species Program.
- Smith, D. G. 1984. Selected freshwater invertebrates proposed for special concern status in Massachusetts. Massachusetts Department of Environmental Quality Engineering, Division of Water Pollution control, Westborough, Massachusetts. 26 pp.

## Olive Vertigo (*Vertigo perryi*, State Special Concern)

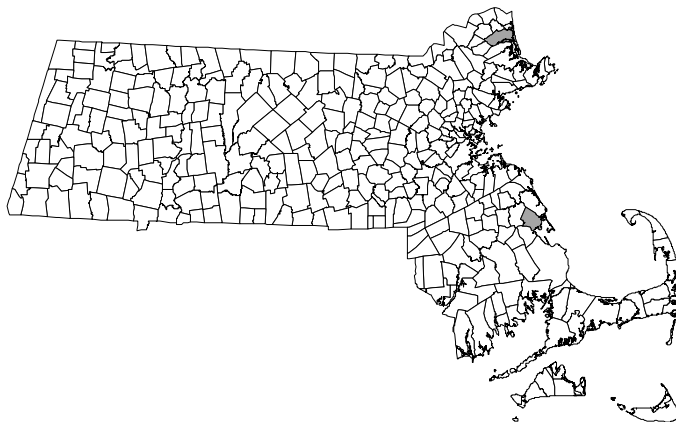
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G1	SU	Marshes & Wet Meadows, Salt Marsh	State List; Globally Rare

### Species Description

The Olive Vertigo is a very small freshwater snail, up to 1.5 to 1.6 mm in length. Its dark olive-buff shell has about 4 ½ whorls and is ovate-conic to almost conic. The aperture is broad, with three, sometimes, four, brownish teeth (Burch 1962).

### Distribution and Abundance

There have been two occurrences of Olive Vertigo documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). However, field work in the summer of 2004 revealed that Olive Vertigo is much more common across Massachusetts than shown here (these data were not available in December, 2004); it was found in 19 sites in addition to the two shown here. On the basis of these recent surveys, this species has been proposed for de-listing from the state list in 2006.



Massachusetts Towns with Recent Occurrences of Olive Vertigo

### Habitat Description

Olive Vertigo snails live in the dead stems and collected detritus at the bases of Tussock Sedge (*Carex stricta*) clumps. Sites where this snail has been found on Tussock Sedge in Massachusetts (including the 2004 surveys) are a range of wooded to open wetlands, most frequently in boggy red maple woodlands, sedge meadows, and the sedge-dominated margins of ponds and ditches.

### Threats

The Olive Vertigo is threatened by destruction or degradation of its wetland habitats, by development, filling, pollution, dredging, colonization by exotic invasive plants, alteration of flooding regimes, and other changes.

### Reference

Burch, J. B. 1962. *How to Know the Eastern Land Snails*. Wm. C. Brown Co., Dubuque, Iowa.

## Vernal Physa (*Physa vernalis*, no state status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	SNR	Vernal Pools, Small Streams, Lakes & Ponds	Globally Rare

### Species Description

The Vernal Physa is a hermaphroditic, small (up to 11 mm in length), narrow to oval snail with a high-spired sinistral shell, radula with teeth in v-shaped rows, no lateral teeth, and no hemoglobin or pseudobranchia. The shell morphology of this species may vary with environment. Note that the taxonomy of this group is unstable.

### Distribution and Abundance

The Vernal Physa is known from Connecticut, Massachusetts, Rhode Island, New York, and Ontario. This species may have been collected but misidentified as another species, *Physa aplectoides*, in Michigan and Ohio. Locations of Massachusetts occurrences have not yet been determined at this point.

### Habitat Description

This species has been found in ponds, ditches, temporary pools, small brooks, and lakes.

### Threats

The major threat to this species is the loss of wetland habitat to draining and development.

### References

Jokinen, E. H. 1992. The freshwater snails of New York state (Mollusca: Gastropoda). State Education Department, New York State Museum, Biological Survey, Albany, NY.

Wethington, A. Family Physidae. Purdue University.

## **H. Freshwater Mussels**



## Dwarf Wedgemussel (*Alasmidonta heterodon*, State Endangered, Federal Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G1G2	S1	Large & Mid-sized Rivers	Federal List; State List; Globally Rare

### Species Description

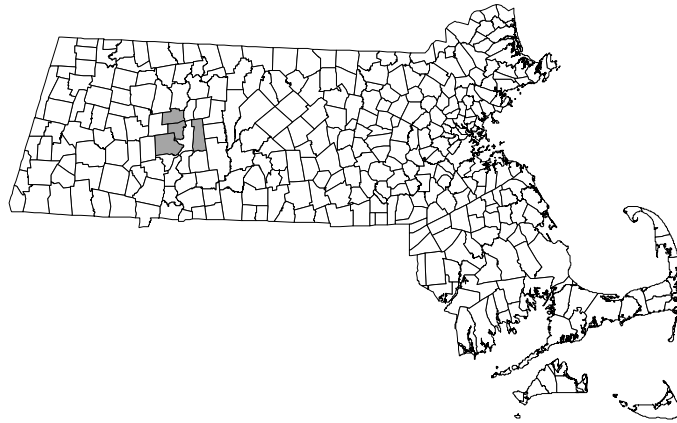
The Dwarf Wedgemussel, sometimes referred to as the Inverted Floater or Ancient Floater, belongs to the family Unionidae. It is the only freshwater mussel in North America with two lateral hinge teeth on the right valve and one on the left valve. It is a small mussel, generally about 1.77 in. long, 0.98 in. high and 0.63 in. wide; the Dwarf Wedgemussel reaches a maximum length of 2.23 inches. Its external shell is yellowish brown, olive brown, or blackish brown in color and usually lacks rays. In general, the shell is wedge-shaped in lateral view (especially in the female), with a thickness of 1 mm, a roundly pointed posterior end, a well-developed dorso-lateral ridge, and concentric lines or rings made of calcium carbonate (which is secreted by the mussel as it grows). The Dwarf Wedgemussel is sexually dimorphic: male shells are more ovate, compressed, and elongate, while female shells are shorter and swollen at the posterior end in order to accommodate the egg-bearing gills.

Dwarf Wedgemussels are long-term breeders; female mussels retain developing larvae in their gills throughout the year, except from mid to late summer, when reproduction occurs. Male mussels release their sperm into the river water; some of the sperm will enter the female mussels through openings in the shell and fertilize the eggs. Eggs are deposited into the gills of the female parent and are brooded until the following spring. As with all other North American species of freshwater mussels, the Dwarf Wedgemussel produces glochidia larvae, which are fish parasites during their early development. Once the eggs hatch in spring, the glochidia are released to seek out a specific fish host to complete their transformation into juvenile mussels, a process that takes 3 to 12 weeks. Freshwater mussels use host fish for several possible reasons, including dispersal protection. The specific host fishes for Dwarf Wedgemussels are unknown, but they are considered to be bottom-dwellers, such as the Tessellated Darter and the Slimy Sculpin. The life span for these mussels is only about 10 years.

The Dwarf Wedgemussel burrows through the mud or sand at the river bottom by alternately contracting and extending its muscular, tongue-like foot. It feeds by drawing in water through two openings in the rear of the shell and using its gills to strain out microorganisms and other food particles. The exhalant aperture has no papillae.

### Distribution and Abundance

There have been six occurrences of Dwarf Wedgemussel documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Dwarf Wedgemussel

## **Habitat Description**

The Dwarf Wedgemussel inhabits well-oxygenated streams and rivers with sand, muddy sand, or gravel bottoms, clay banks (at least occasionally), slow to moderate currents, and little silt deposition; it is never found in still waters. All extant populations are in tributaries to the Connecticut River.

## **Threats**

The Dwarf Wedgemussel has declined precipitously throughout its range since the mid-1800's as a result of habitat degradation and pollution. Habitat degradation includes the damming of rivers and streams, surface and groundwater withdrawals, and exotic invasive species. Pollution includes nutrient loading, such as livestock waste and erosion, roadway run-off and siltation, and failing septic systems. A small oil spill eliminated the entire population in the Mill River in Northampton.

The damming of a river or a stream can alter the natural flow and temperature regimes, which the Dwarf Wedgemussels cannot tolerate. Along with physically changing the environment, dams also restrict the migration of the mussel's host fish, inhibiting the dispersion of glochidia. Beaver dams are a concern in smaller rivers where the ponded waters deposit silt, smothering rare mussels.

## **Reference**

Massachusetts Natural Heritage & Endangered Species Program. In prep. Dwarf Wedgemussel (*Alasmidonta heterodon*) Fact Sheet.

## Triangle Floater (*Alasmidonta undulata*, State Special Concern)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S3	Lakes & Ponds, Large & Mid-sized Rivers, Connecticut & Merrimack Mainstems	State List

### Species Description

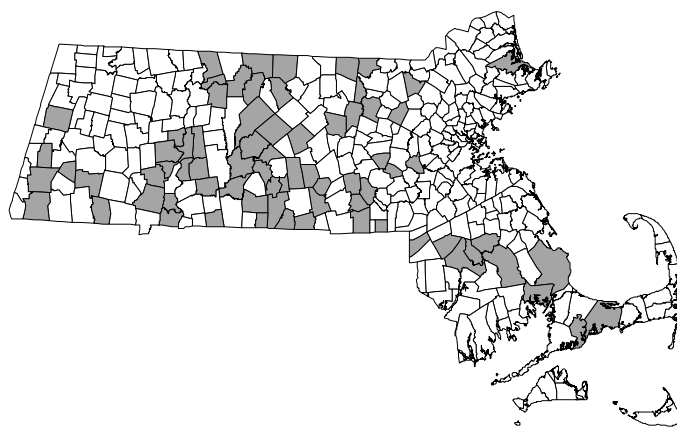
The Triangle Floater, a member of the family Unionidae, is a small species rarely exceeding 1.97 inches in shell length. This mussel has a more or less round outline, although some specimens do elongate posteriorly. The posterior margin forms a distinct angle at its extremity. The beaks or umbos are greatly inflated and in young to medium-aged specimens there are several coarse ridges extending out onto the disk. The shell exterior is shiny, yellowish in young individuals and greenish brown to black in older shells. Color rays are common on the shell surface, especially younger animals. The hinge contains well-developed pseudocardinal teeth, but lateral teeth are absent. The anterior part of the shell is thickened and the nacre is pearly white with a tincture of blue posteriorly.

The Triangle Floater is a long-term breeder. Males release sperm in mid-summer; some of the sperm will enter the female mussels through openings in the shell and fertilize the eggs. Fertilized eggs are deposited into the female's gills. Developed larvae are held through to the following spring when they are released. The parasitic glochidia larvae have pointed spiny hooks on each valve that grasp onto the soft flesh of its host's fins and buccal cavity. Freshwater mussels use host fish for several possible reasons, including dispersal protection. The host fishes for the Triangle Floater are presumed to be cyprinids; both Fallfish and Common Shiner have been observed with attached glochidia from this species. Following the parasitic phase, young mussels grow rapidly their first several years of life. Their life span is unknown, but it is probably less than 15 years.

The Triangle Floater burrows through the mud or sand at the river bottom by alternately contracting and extending its muscular, tongue-like foot. It feeds by drawing in water through two openings in the rear of the shell and using its gills to strain out microorganisms and other food particles. The exhalent aperture has no papillae.

### Distribution and Abundance

There have been 89 occurrences of Triangle Floater documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Triangle Floater

### Habitat Description

At one time the Triangle Floater was one of the most common species of freshwater mussel in Massachusetts. The species has been recorded in standing and moving water where clean sandy substrates prevailed; its preferred habitat

is slow-moving valley streams. It has been found in cobble- and gravel-dominated streams where sand accumulates between the cobbles and stones. It does not seem to tolerate mud.

### **Threats**

The existence of Triangle Floater populations is threatened because of habitat degradation and pollution. Habitat degradation includes the damming of rivers and streams, surface and groundwater withdrawals, and exotic invasive species. Pollution includes nutrient loading, such as livestock waste and erosion, roadway run-off and siltation, and failing septic systems.

The damming of a river or a stream can alter the natural flow and temperature regimes, which the mussels cannot tolerate. Along with physically changing the environment, dams also restrict the migration of the mussel's host fish, inhibiting the dispersion of glochidia. Beaver dams are a concern in smaller rivers where the ponded waters deposit silt, smothering rare mussels.

### **Reference**

Massachusetts Natural Heritage & Endangered Species Program. In prep. Triangle Floater (*Alasmidonta undulata*) Fact Sheet.

## Brook Floater (*Alasmidonta varicosa*, State Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S1	Large & Mid-sized Rivers	State List; Globally Rare; NE F&W Agencies

### Species Description

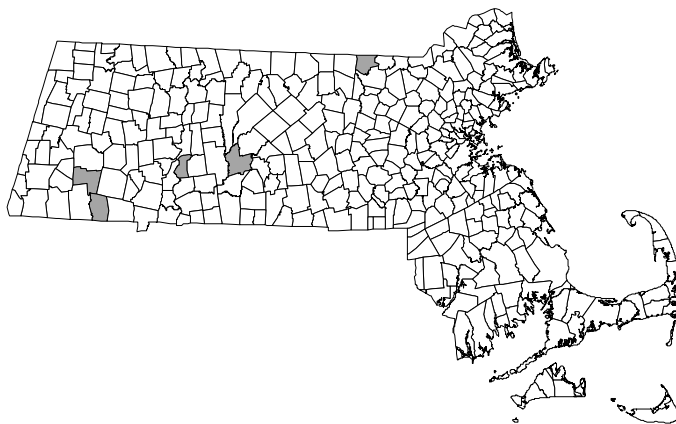
The Brook Floater, also known as the Swollen Wedgemussel, is a medium-sized freshwater mussel in the family Unionidae. Its valves appear to be “swollen” when viewed laterally. Adult specimens in Massachusetts usually do not exceed 2.76 inches in length. The shell exterior varies from yellowish-green in juveniles, to brownish-black in older animals. Animals with a light-colored shell may, in addition, have a few dark rays on the shell surface. The shell surface is sculptured on the dorso-posterior surface by several low wavy ridges, giving the surface a scalloped appearance. The ridges become less pronounced with increased age. The hinge of the shell has only rudimentary teeth. The exhalant aperture has no papillae. The foot is often salmon-pink in color.

The Brook Floater is a long-term breeder. In the summer, females deposit eggs into the gills. While in the gills, the eggs are incubated and develop into larvae called glochidia. The mature glochidia are released the following spring. Glochidia are obligatory parasites of fish, which host the encrusted larvae while they transform into juvenile mussels. Freshwater mussels use host fish for several possible reasons, including dispersal protection. The host fishes of Brook Floater are quite likely the Longnose Dace, Blacknose Dace, Golden Shiner, Pumpkinseed Sunfish, Slimy Sculpin, Yellow Perch, and Margined Madtom. Following the parasitic phase, the juvenile mussel commences its benthic existence. One distinctive behavior of the Brook Floater is that, when removed from the water, it will relax its adductor muscles, slightly opening its valves and exposing its foot.

The Brook Floater burrows through the mud or sand at the river bottom by alternately contracting and extending its muscular, tongue-like foot. It feeds by drawing in water through two openings in the rear of the shell and using its gills to strain out microorganisms and other food particles.

### Distribution and Abundance

There have been nine occurrences of Brook Floater documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). Historically, this mussel was widespread in New England and, in Massachusetts, the species was recorded from several streams and ponds, especially near the coast. But, over the past two decades, the Brook Floater has declined in Massachusetts to the point that some of the historical populations no longer exist. Recently discovered populations have, for the most part, been comprised of few individuals and are located in the Chicopee River, Connecticut River, and Farmington River watersheds.



Massachusetts Towns with Recent Occurrences of Brook Floater

**Habitat Description**

This species is found in small to medium-sized streams with moderate to slow flow. These streams have stable substrates such as rough sand, cobble, and gravel; rooted aquatic vegetation is usually present.

**Threats**

As in the case with all freshwater mussels, habitat degradation and pollution are the most common causes of species decline and eventual elimination. Habitat degradation includes the damming of rivers and streams, surface and groundwater withdrawals, and exotic invasive species. Pollution includes nutrient loading, such as livestock waste and erosion, roadway run-off and siltation, and failing septic systems.

The damming of a river or a stream can alter the natural flow and temperature regimes, which the mussels cannot tolerate. Along with physically changing the environment, dams also restrict the migration of the mussel's host fish, inhibiting the dispersion of glochidia. Beaver dams are a concern in smaller rivers where the ponded waters deposit silt, smothering rare mussels.

**Reference**

Massachusetts Natural Heritage & Endangered Species Program. In prep. Brook Floater (*Alasmidonta varicosa*) Fact Sheet.

## Yellow Lampmussel (*Lampsilis cariosa*, State Endangered)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S1	Large & Mid-sized Rivers, Connecticut & Merrimack Mainstems	State List; Globally Rare; NE F&W Agencies

### Species Description

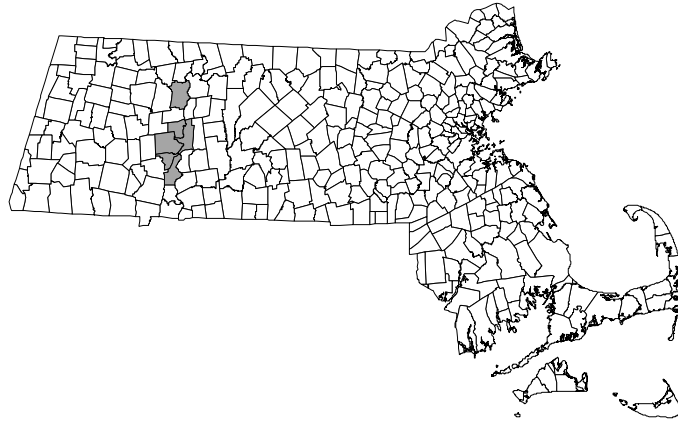
The Yellow Lampmussel, also known as the Yellow Rivermucket, is a large distinctive species of freshwater mussel. This species is sexually dimorphic; female shells are shorter, higher, and more distinctly ovate in outline. Adult females are about 3.78 in. long, 2.80 in. high, and 1.73 in. wide; adult males are approximately 4.80 in. long, 3.15 in. high, and 2.01 in. wide, but may attain a maximum length of 5.12 in. The posterior end is roundly pointed in males, but is truncated in females. The anterior end of the shell is rounder in both sexes. Juveniles have a bright yellow shell, while adults have a yellowish-red shell without rays. The Yellow Lampmussel's shell has a moderately smooth surface, but possesses numerous concentric lines that are formed as the mussel grows. The elevated umbo on the shell delineates the youngest portion of the mussel's shell. The Yellow Lampmussel's fully developed, articulated hinge teeth are used to interlock the shell valves together. The mussel also has two lateral teeth on the left valve and only one lateral tooth on the right valve. The lower exhalent aperture has minute papillae, and the mantle margin is smooth with grayish streaks or dots, a well-developed and brightly pigmented flag-like extension, and a dark eye-spot.

Yellow Lampmussels are long-term breeders; females carry developing larvae in their gills throughout the year, except for the summer, when reproduction occurs. Male mussels release their sperm into the river water; some of the sperm will enter the female mussels through openings in the shell and fertilize the eggs. Eggs are deposited into the gills of the female parent and are brooded until the following spring. As with all other North American species of freshwater mussels, the Yellow Lampmussel produces glochidia larvae, which attach to a specific host fish during early development. It is one of the few species in New England that uses a modified mantle flap to attract host fish. Freshwater mussels use a host fish for several possible reasons, including dispersal protection. Once they transform into juvenile mussels, a process which takes 3 to 12 weeks, the mussels commence a benthic existence. The host fish for the Yellow Lampmussel is unknown, but may be a species of sunfish or other warm-water fish species.

The Yellow Lampmussel burrows through the mud at the river bottom by alternately contracting and extending its muscular, tongue-like foot. It feeds by drawing in water through two openings in the rear of the shell and using its gills to strain out microorganisms and other food particles.

### Distribution and Abundance

There have been four occurrences of Yellow Lampmussel documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). Historically, it was found in the Merrimack River near Haverhill and throughout the Connecticut River. Currently, it is only known from the mainstem of the Connecticut River.



**Massachusetts Towns with Recent Occurrences of Yellow Lampmussel**

### **Habitat Description**

The Yellow Lampmussel inhabits a range of substrates in large fast-flowing rivers, and is occasionally found in ponds, although not in Massachusetts.

### **Threats**

As in the case with all freshwater mussels, habitat degradation and pollution are the most common causes of species decline and eventual elimination. Habitat degradation includes the damming of rivers and streams, surface and groundwater withdrawals, and exotic invasive species. Pollution includes nutrient loading, such as livestock waste and erosion, roadway run-off and siltation, and failing septic systems.

The damming of a river or a stream can alter the natural flow and temperature regimes, which the mussels cannot tolerate. Along with physically changing the environment, dams also restrict the migration of the mussel's host fish, inhibiting the dispersion of glochidia.

### **Reference**

Massachusetts Natural Heritage & Endangered Species Program. In prep. Yellow Lampmussel (*Lampsilis cariosa*) Fact Sheet.



## Tidewater Mucket (*Leptodea ochracea*, State Special Concern)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S2	Lakes & Ponds, Large & Mid-sized Rivers, Connecticut & Merrimack Mainstems	State List; NE F&W Agencies

### Species Description

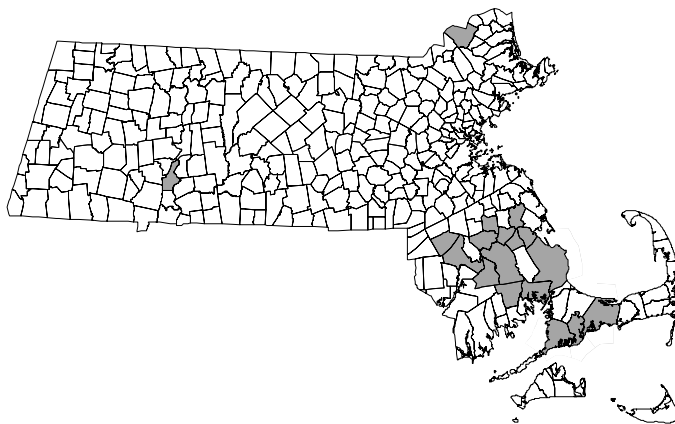
The Tidewater Mucket is a freshwater mussel in the family Unionidae. It is a medium-sized mussel whose shell ranges up to 3.15 in. long, 2.17 in. high, and 1.58 in. wide. Its shell is ovate in both sexes. The males are relatively longer with a bluntly pointed posterior end, while the females have a more rounded or truncated posterior. The shell is thin, fragile, and has a translucent quality. The outer covering of the shell (periostracum) is brownish, ranging from a pale reddish-orange to a pale olive, and with rays or with narrow, greenish, rather obscure rays all over the shell. Its surface has low concentric wrinkles and prominent growth rays. The Tidewater Mucket has one lateral tooth and two pseudocardinal teeth located on the right valve, and two lateral teeth located on the left valve. The lower exhalent aperture has minute papillae, and the mantle margin is smooth and grayish.

Like other muckets, the Tidewater Mucket is a long-term breeder, which means eggs are deposited by the female into her gills in the summer, where they remain and develop into larvae. The following spring, the larvae are released. The larvae of all freshwater mussels living in Massachusetts are called glochidia and are parasites on fish. Glochidia infest fish for several possible reasons, including dispersal protection while undergoing metamorphosis from the larval stage to the juvenile mussel. Following transformation, the juvenile mussel drops off the host fish and commences a benthic existence. The fish species parasitized by the Tidewater Mucket are unknown, but the habitat suggests an anadromous fish, possibly the Alewife. Juvenile muckets generally take a few years to mature. Adults can breed throughout their lifetime, which may range up to five or more years.

The Tidewater Mucket burrows through the mud at the river bottom by alternately contracting and extending its muscular, tongue-like foot. It feeds by drawing in water through two openings in the rear of the shell and using its gills to strain out microorganisms and other food particles.

### Distribution and Abundance

There have been 26 occurrences of Tidewater Mucket documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). In Massachusetts, this species is found only in several Great Ponds (over 10 acres in size) on Cape Cod and in the Buzzard's Bay, South Coastal, and Taunton River watersheds. One live mussel was found in the Connecticut River; it is not known whether this represents a viable population.



**Massachusetts Towns with Recent Occurrences of Tidewater Mucket**

## **Habitat Description**

This species occurs principally in quiet waters (i.e., ponds, canals, and slow-moving parts of rivers). In Massachusetts, the Tidewater Mucket prefers natural coastal freshwater ponds of several acres with clear, clean water and sandy substrates. In other parts of its range, this species may be found on mud or sand bottoms. It almost always occurs near the seacoast.

## **Threats**

Habitat degradation and pollution threaten the continued existence of the species in Massachusetts. Habitat degradation includes the alteration of ponds and lakes, surface and ground water withdrawal, and exotic invasive species. Pollution includes nutrient loading, such as livestock waste and erosion, roadway run-off and siltation, and failing septic systems. Alterations of ponds or lakes can result in a loss of host fish, thus prohibiting the incubation of glochidia. Recreational boating and jet skis degrade mussel habitat because of the increase in siltation due to wakes and disturbance of the bottom sediments by motors, and because of contamination of the water by petroleum products.

## **Reference**

Massachusetts Natural Heritage & Endangered Species Program. In prep. Tidewater Mucket (*Leptodea ochracea*) Fact Sheet.

## Eastern Pondmussel (*Ligumia nasuta*, State Special Concern)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4G5	S3	Lakes & Ponds, Large & Mid-sized Rivers, Connecticut & Merrimack Mainstems	State List; NE F&W Agencies

### Species Description

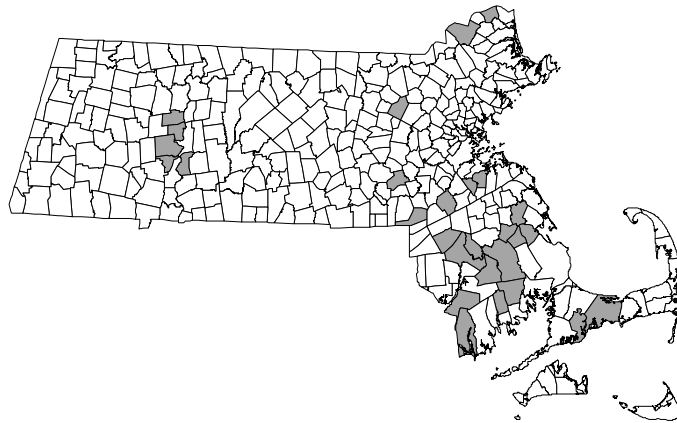
The Eastern Pondmussel is a medium- to large-sized freshwater mussel that measures approximately 3.94 in. in length, 1.77 in. high, and 0.98 in. wide. The distinctive shell is elongate in shape, with a narrowed, pointed posterior and compressed valves. The outer covering of the shell is usually brown or blackish, except in young individuals and in a few pond populations in which the shell is olive-green. On light shells, dark rays extending across the shell are sometimes evident. Anterior and posterior hinge teeth are well developed. The right valve has one or two pseudocardinal teeth and one lateral tooth, and the left valve has two lateral teeth. Adult male and female shells are different, with the female shell showing a distinct bulge ventrally. The lower exhalant aperture has minute papillae, and the mantle edge has digitiform extensions.

The Eastern Pondmussel is a long-term breeder, which means the female incubates the eggs and larvae in her gills for almost a year. Eggs are deposited into the gills in summer and then develop over the ensuing months into larvae called glochidia, which are parasitic on fish. The following spring, the glochidia are released. Glochidia are parasitic on fish for several possible reasons, including dispersal protection. However, the species of fish parasitized by the Eastern Pondmussel remains unknown. The fish carries the parasite on its gills until it transforms into a juvenile mussel, when it drops off the fish to commence a benthic existence.

The Eastern Pondmussel burrows through the mud at the river bottom by alternately contracting and extending its muscular, tongue-like foot. It feeds by drawing in water through two openings in the rear of the shell and using its gills to strain out microorganisms and other food particles.

### Distribution and Abundance

There have been 37 occurrences of Eastern Pondmussel documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Eastern Pondmussel

### Habitat Description

The Eastern Pondmussel occurs in lakes where suitable sandy habitat is found, in slackwater areas of rivers, and in canals. Sand, silty sand, and, to a lesser extent, gravelly substrates in slow-moving to standing water are the preferred habitats of this species. As is the case with other freshwater mussel species, the presence of a stable

substrate appears to be necessary. The species is only rarely found in streams with a moderate current, but has been found to flourish below the falls of old, undisturbed impoundments.

### **Threats**

Habitat degradation and pollution threaten the continued existence of the species in Massachusetts. Habitat degradation includes the alteration of ponds and lakes, surface and ground water withdrawal, and exotic invasive species. Pollution includes nutrient loading, such as livestock waste and erosion, roadway run-off and siltation, and failing septic systems. Alterations of ponds or lakes can result in a loss of host fish, thus prohibiting the incubation of glochidia. Recreational boating and jet skis degrade mussel habitat because of the increase in siltation due to wakes and disturbance of the bottom sediments by motors, and because of contamination of the water by petroleum products.

### **Reference**

Massachusetts Natural Heritage & Endangered Species Program. In prep. Eastern Pondmussel (*Ligumia nasuta*) Fact Sheet.

## Creeper (*Strophitus undulatus*, State Special Concern)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Large & Mid-sized Rivers, Connecticut & Merrimack Mainstems	State List

### Species Description

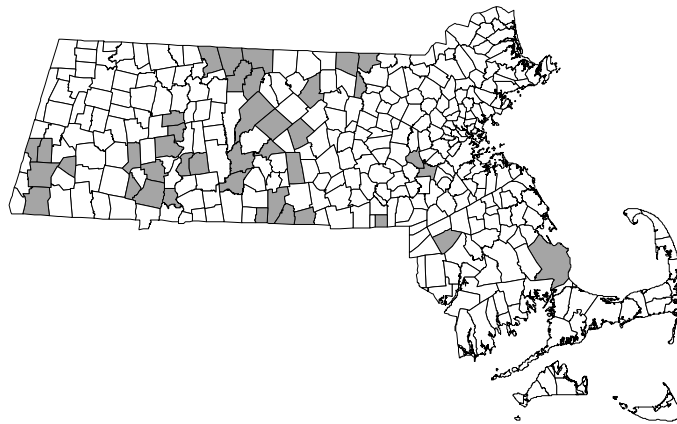
The Creeper is a freshwater mussel in the family Unionidae. It is a small to medium-sized mussel species normally reaching 1.97 to 2.76 in. shell length; however, specimens over 3.94 in. in length have been seen. Specimens often have a biangulate posterior margin and a gently rounded ventral margin. The color of the shell exterior on younger and cleaner individuals varies from a yellowish-green to dark green, with dark color rays radiating from the beak. Older shells or those from marginal habitats tend to be dark brown to black. The hinge of the shell lacks hinge teeth, but contains a very slight swelling in the position of the pseudocardinal tooth in both valves. The interior nacre is an iridescent white with bluish tint. Usually a faint salmon color is present in the center of the shell. The exhalent apertures do not have any papillae.

The Creeper is a long-term breeder. Males release sperm in mid-summer and the fertilized eggs are deposited into the female's gills. Developing larvae are held through to the following spring when they are released as glochidia. Glochidia are parasitic on fish. They have pointed spiny hooks on each shell valve, which grasp onto the soft flesh of the fish host's fins and buccal cavity. Freshwater mussels parasitize host fish for several possible reasons, including dispersal protection. Host fishes for the Creeper include Fallfish, Longnose Dace, Golden Shiner, and Slimy Sculpin, as well as larval Two-lined Salamanders. Possibly Largemouth Bass and Creek Chub are parasitized as well. Following the parasitic phase, young mussels grow to about 1.18 in. during their first three or four years. Their life span is about 15 years under favorable conditions.

The Creeper burrows through the mud at the river bottom by alternately contracting and extending its muscular, tongue-like foot. It feeds by drawing in water through two openings in the rear of the shell and using its gills to strain out microorganisms and other food particles.

### Distribution and Abundance

There have been 51 occurrences of Creeper documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). Historically, the Creeper occurred in natural ponds, streams, and rivers throughout Massachusetts. Museum specimens document the historic occurrence of this mussel in every major watershed in Massachusetts except the Hoosic River system.



Massachusetts Towns with Recent Occurrences of Creeper

**Habitat Description**

The species prefers clean sandy substrates, but will tolerate firm muddy bottoms. Existing populations are restricted to sand-silt, rarely mud-silt, environments in streams and rivers.

**Threats**

As in the case with all freshwater mussels, habitat degradation and pollution are the most common causes of species decline and eventual elimination. Habitat degradation includes the damming of rivers and streams, surface and groundwater withdrawals, and exotic invasive species. Pollution includes nutrient loading, such as livestock waste and erosion, roadway run-off and siltation, and failing septic systems.

The damming of a river or a stream can alter the natural flow and temperature regimes, which the mussels cannot tolerate. Along with physically changing the environment, dams also restrict the migration of the mussel's host fish, inhibiting the dispersion of glochidia. Beaver dams are a concern in smaller rivers where the ponded waters deposit silt, smothering rare mussels.

**Reference**

Massachusetts Natural Heritage & Endangered Species Program. In prep. Creeper (*Strophitus undulatus*) Fact Sheet.

## **I. Crustaceans**

## Appalachian Brook Crayfish (*Cambarus bartonii*, State Special Concern)

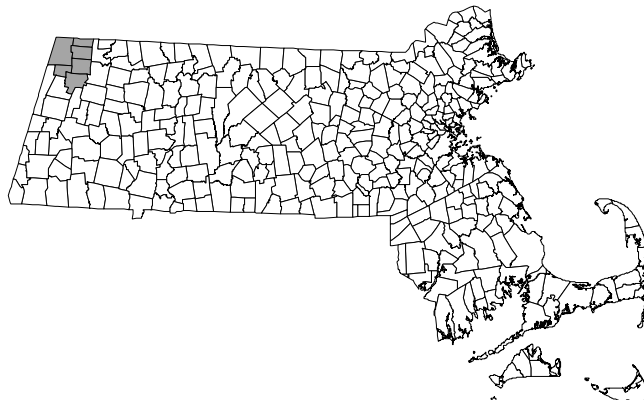
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Small Streams	State List

### Species Description

The Appalachian Brook Crayfish is a medium-sized (150 mm in total length) crayfish in the crustacean order Decapoda, without any particular or outstanding markings. Adults tend to be a uniform brownish-tan color, varying to reddish-brown in older adults. Juveniles are usually lighter colored. The tips of the claws and the rostrum (a projection between the eyes) margins in older adults can be purplish-red. *Cambarus bartonii* can be most easily separated from other crayfish in Massachusetts by the shape of the rostrum, which is quite broad, short, and blunt, with only a short, anterior acumen (point). Males and females are distinguished by the presence in males of highly modified pleopods (abdominal appendages) on the first two abdominal segments. The pleopods are unmodified in females. The tips of the first pair of pleopods in males are flattened and sharply bent.

### Distribution and Abundance

The Appalachian Brook Crayfish is widely distributed throughout eastern North America except in coastal regions and interior New England. In Massachusetts, the species is confined to the Hoosic River drainage system in the northwestern part of the state. There have been 21 occurrences of Appalachian Brook Crayfish documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Appalachian Brook Crayfish

### Habitat Description

In Massachusetts, the Appalachian Brook Crayfish is typically found in upland and mountain streams, reaching an altitude of about 1550 feet (470 m). It occurs less commonly in unaltered sections of the Hoosic River, where there is moderate to strong current. The species tunnels under large rocks and boulders that are well imbricated in the substrate in mid-stream and along the bank.

### Threats

Because the Hoosic River has been altered considerably and is periodically subjected to various types of pollution, the river can no longer, except for one short section, support this species. As a result, the upland stream populations are isolated from one another and subject to the potentially unfavorable consequences of a reduced gene pool. Other threats to its survival in the state include alterations and damming of inhabited streams, and pollution originating from adjacent residential and commercial properties. In the single section of the Hoosic River inhabited by the Appalachian Brook Crayfish, an introduced crayfish, *Orconectes virilis*, has similar burrowing habits and may compete with the Appalachian Brook Crayfish for habitat space.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Appalachian Brook Crayfish (*Cambarus bartonii*) Fact Sheet.



## Intricate Fairy Shrimp (*Eubbranchipus intricatus*, State Special Concern)

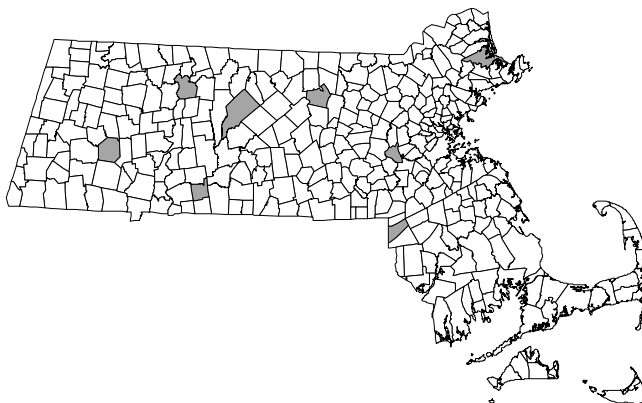
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Vernal Pools	State List

### Species Description

The Intricate Fairy Shrimp, also known as the Smoothlip Fairy Shrimp, is a small, elongated crustacean that is distinctly segmented with a series of paired, flattened, leaflike appendages that resemble legs and are used for respiration and locomotion. This species is reddish-yellow or orange and, as it matures, the orange color gets darker and the extremities become yellowish-white. The head is enlarged with stalked, compound eyes. The abdomen is long and tipped with two distinct tail-like structures. The adult reaches a length of 12 to 15 mm when fully grown. Males possess enlarged second antennae as well as a pair of long antennal appendages used for holding females during mating. Females lack the long appendages, but they possess an obvious abdominal brood pouch where eggs are carried.

### Distribution and Abundance

The Intricate Fairy Shrimp is recorded from several localities in Canada, but in the United States it is known only from Massachusetts and Montana. There have been eight occurrences of Intricate Fairy Shrimp documented in Massachusetts since 1980, scattered throughout the state (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Intricate Fairy Shrimp

### Habitat Description

In Massachusetts, this species is known as an inhabitant of ephemeral (vernal) ponds. These ponds are present at least during the late winter and spring, but are usually dry at other times of the year. Such environments cannot support fish populations year round and are often used by mole salamanders, wood frogs, and other animals for breeding purposes. The Intricate Fairy Shrimp is typically found in deeper, less temporary, and more bowl-shaped pools than the more common Springtime Fairy Shrimp (*Eubbranchipus vernalis*; D.G. Smith, personal communication 2003).

### Threats

Loss of ephemeral ponds due to development is the most obvious threat to this species. Changes in hydrology that interfere with the length and timing of pool inundation are threats to existing populations. Pollutants moving through groundwater in the vicinity of temporary ponds also represent possible threats to the Intricate Fairy Shrimp. Forest cutting, intentional stocking of fish during wet periods, and excavations of basins containing vernal pools are additional concerns.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1989. Intricate Fairy Shrimp (*Eubbranchipus intricatus*) Fact Sheet.

## Agassiz's Clam Shrimp (*Eulimnadia agassizii*, State Endangered)

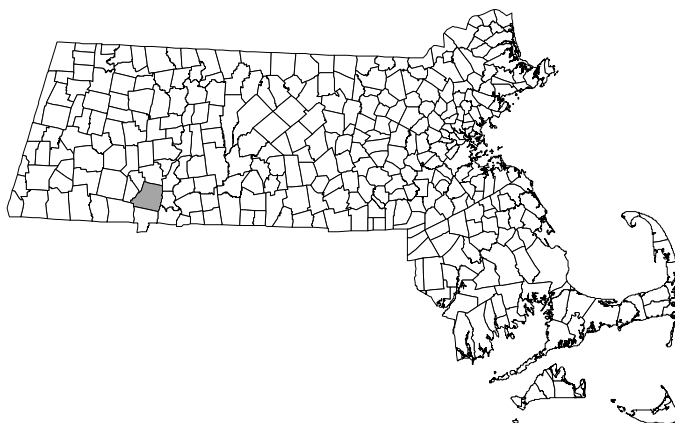
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S1	Vernal Pools	State List; Globally Rare

### Species Description

Agassiz's Clam Shrimp is a small crustacean that resembles a mollusk at first glance because it is enclosed in a bivalved structure called a carapace. The egg-shaped carapace is transparent, ranging in color from clear to brown. It consists of two shell-like valves that are connected by a fold, each with 4 (occasionally 5) growth lines. The valves enclose the head and eyes, body, and feathery appendages of Agassiz's Clam Shrimp. Like all clam shrimps, this species swims with the fold of its carapace pointing up and its appendages pointing down to aid in locomotion, respiration, and feeding. Specimens of Agassiz's Clam Shrimp can reach up to 9 mm, but examination of specimens from one population reached only ~6.0 mm.

### Distribution and Abundance

Prior to 1977, Agassiz's Clam Shrimp was known from two localities in southeastern Massachusetts (Woods Hole and Gosnold). Newer records come from the towns of Westfield and Bourne. Belk (1989) has suggested that the clam shrimp *E. stoningtonensis* is actually the same species as Agassiz's Clam Shrimp, expanding the range of Agassiz's Clam Shrimp to include Stonington, Connecticut. Smith (2000) suggests that this species is a southern New England endemic, meaning that its range is likely restricted to this region. There has been one occurrence of Agassiz's Clam Shrimp documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Agassiz's Clam Shrimp

### Habitat Description

Agassiz's Clam Shrimp has been found in the ephemeral pools of a floodplain depression and in a flooded hay field after the heavy rain of a large storm (Smith 1995). It has also been found in a flooded sand trap and a nearby flooded depression on a golf course (Zinn and Dexter 1962). In 1999, Agassiz's Clam Shrimp was reportedly found in a heavily vegetated drainage ditch that was dominated by butterfly weed (*Asclepias tuberosa*; J. Kelly, personal communication 2004).

### Threats

Development that disrupts these depressions and pools is the most obvious threat to this species. Draining, filling, and contamination from seepage or the leaching of toxic substances into these habitats also represent potential threats.

## References

- Belk, D. 1989. Identification of species in the conchostracan genus *Eulimnadia* by egg shell morphology. *Journal of Crustacean Biology* 9: 115-125.
- Kelly, J.P. 2004. Natural Resources Planner, Massachusetts Army National Guard, Bourne, MA.
- Smith, D. G. 1995. Notes on the status and natural history of Limnadiid clam shrimp in southern New England. *Anostracan News* 3 (2):3-4.
- Smith, D. G. 2000. Keys to the Freshwater Macroinvertebrates of southern New England. Published by author. Sunderland, MA. 243 pp.
- Zinn, D. J. and R. W. Dexter. 1962. Reappearance of *Eulimnadia agassizii* with notes on its biology and life history. *Science* 137 (3531): 676-677.

## Northern Spring Amphipod (*Gammarus pseudolimnaeus*, State Special Concern)

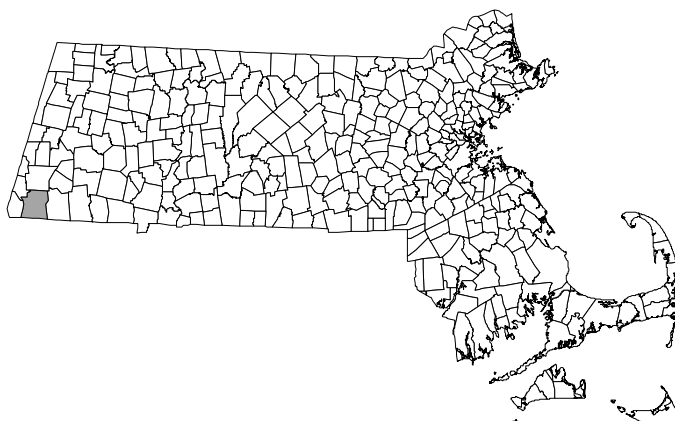
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Springs, Caves & Mines	State List

### Species Description

The Northern Spring Amphipod is a laterally compressed, many-segmented freshwater crustacean that looks like a small, flat shrimp. It is uniformly dark in appearance; mature specimens can reach lengths of 11 to 18 mm (Bousfield 1958, Bell 1971, Hynes and Harper 1972). Its head has two pairs of antennae, one pair of eyes, and is fused with the first of seven thoracic segments. Each thoracic segment, as well as the six abdominal segments, has a pair of legs and/or gills that aid in respiration and locomotion.

### Distribution and Abundance

The range of the Northern Spring Amphipod extends throughout the previously glaciated regions of New York and the Great Lakes region. Three localities in southwestern Massachusetts and an isolated locality in the central Hudson River system in New York represent the currently known southeastern range limit of the species along the Atlantic seaboard. The Massachusetts populations appear to be the only populations in New England, and are possibly glacial relict populations (D.G. Smith, personal communication 2003). There have been nine occurrences of the Northern Spring Amphipod documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



**Massachusetts Towns with Recent Occurrences of Northern Spring Amphipod**

### Habitat Description

In Massachusetts, the Northern Spring Amphipod has only been found in vegetated, calcium-rich springs and spring-fed streams that flow through the swampy lowlands of the western drainages of the Housatonic River basin (Smith 1997). However, throughout its range it inhabits a variety of aquatic habitats with an affinity toward springs and spring-fed streams. This species can be found in cool, hard waters that are high in carbonate from the associated bedrock, and is occasionally found in outlet streams (D.G. Smith, personal communication 2003)

### Threats

The Northern Spring Amphipod lives in clear, unpolluted waters. Land development or water-related projects that might result in groundwater contamination are a potential threat to this species.

### References

Bell, R.T. 1971. Handbook of the Malacostraca of Vermont and neighboring regions. Zoology Department University of Vermont. Burlington, VT. 65 pp.

Bousfield, E. 1958. Fresh-water amphipod crustaceans of glaciated North America. *Canadian Field Naturalist* 72: 55-113.

Hynes, H.B.N. and F. Harper. 1972. The life histories of *Gammarus lacustris* and *Gammarus pseudolimnaeus* in southern Ontario. *Crustaceana*, Suppl 3. Studies on Peracarida: 329-341.

Smith, D.G. 1997. An annotated checklist of Malacostracans (Crustacea) inhabiting southern New England fresh waters. *Journal of Freshwater Ecology* 12 (2): 217-223.

## American Clam Shrimp (*Limnadia lenticularis*, State Special Concern)

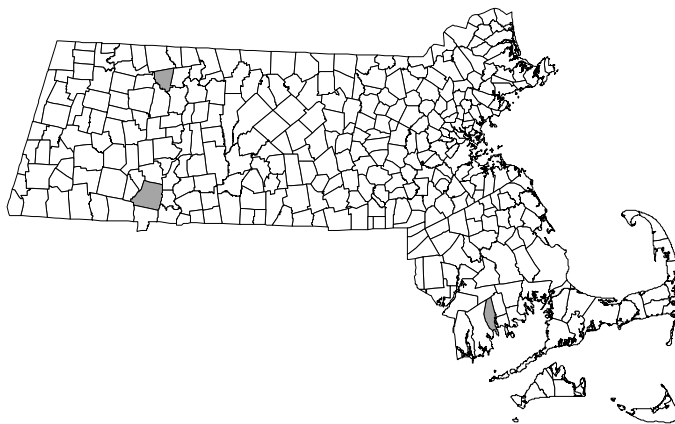
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S1	Vernal Pools	State List; Globally Rare

### Species Description

The American Clam Shrimp, also known as the Euroamerican Clam Shrimp, is a small crustacean from the class Branchiopoda that resembles a mollusk at first glance because it is enclosed in a bivalved structure called a carapace. The egg-shaped carapace is transparent and consists of two shell-like valves that are connected by a fold, each with 7 to 18 growth lines. The valves enclose the American Clam Shrimp's head and eyes, body, and feathery appendages. Like all clam shrimps, this species swims with the fold of its carapace pointing up and its appendages pointing down to aid in locomotion, respiration, and feeding. Massachusetts specimens average 10 mm in length.

### Distribution and Abundance

There have been three occurrences of American Clam Shrimp documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of American Clam Shrimp

### Habitat Description

The American Clam Shrimp inhabits ephemeral (vernal) pools. These ponds are present during the late winter and spring, but dry at other times of the year. Small numbers of the American Clam Shrimp have been recorded from three Massachusetts habitats: a flooded depression in an old pasture field, a flooded hay field depression, and the weedy shoreline of an Atlantic white cedar swamp. Biologists monitored the population in the hayfield depression, which fills with snowmelt and rainfall in the spring. The depression held water for about 3 weeks, was 1 acre in size, with a maximum depth of ~3 feet. Once dried, the habitat showed no evidence of the pool, but clam shrimp bodies were found in the moist soil (Smith 1995). Elsewhere, this species has been found in small, shallow, isolated depressions in hardwood forests with dark-colored, acidic waters and short wet periods of 2 to 3 months (Battle and Golladay 2002; DiBiase and Taylor 2003).

### Threats

Losses of these pools to development, draining, filling, or contamination from pesticides or toxic substances have the potential to threaten this species. Hydrologic alterations may interfere with length and timing of habitat inundation and could cause local population extinction.

### References

Battle, J.M., and S.W. Golladay. 2002. Aquatic invertebrates in hardwood depressions of southwest Georgia. *Southeastern Naturalist* 1(2): 149-158.

DiBiase, A.E., and B.E. Taylor. 2003. New reports of fairy shrimps (Crustacea: Anostraca) and clam shrimps (Crustacea: Laevicaudata and Spinicaudata) from South Carolina. *Southeastern Naturalist* 2(2): 207-216.

Smith, D.G. 1995. Notes on the status and natural history of limnadiid clam shrimp in southern New England. *Anostracan News* 3(2): 3-4.

## Taconic Cave Amphipod (*Stygobromus borealis*, State Endangered)

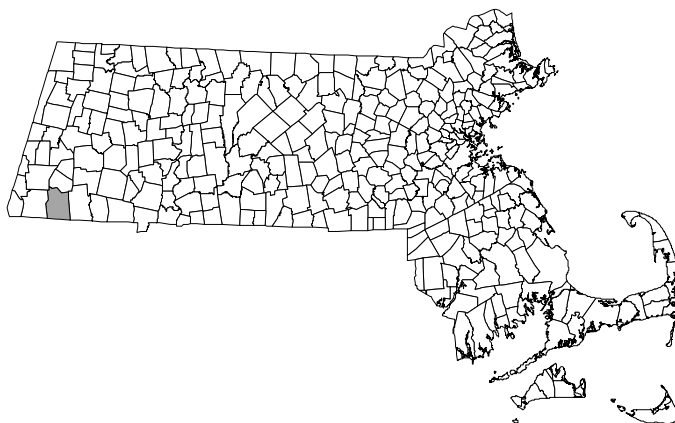
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S1	Springs, Caves & Mines	State List; Globally Rare

### Species Description

The Taconic Cave Amphipod is very rare and one of two known subterranean crustaceans in Massachusetts. This amphipod is a member of the family Crangonyctidae and looks like a small, flat shrimp. It has no eyes and no pigment, giving it a whitish, creamy, or straw-colored appearance. Adults are approximately 3 to 4 mm in length. Males can be distinguished from females based on the characteristics of the terminal appendages (Holsinger 1978).

### Distribution and Abundance

The range of this species seems to be limited. It is only known from one site in the karst terrain of the Taconic Mountains, which is scarce in Massachusetts. The Taconic Cave Amphipod has been collected from only two other sites in the northern Taconic Mountains, one in Vermont and the other in New York (Holsinger 1978). Based on the literature and habitat information collected to date, it is unclear as to the extent of this species' range. The Massachusetts population is presumed to be at the southern range limit for this species (Smith 1997). There has been one occurrence of Taconic Cave Amphipod documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Taconic Cave Amphipod

### Habitat Description

The Taconic Cave Amphipod is found in the subterranean drainage systems of karst terrain in the Taconic Mountains. In Massachusetts and New York, the only description of habitat has been springhouses in New Marlborough (Smith 1986) and Rensselaer County (Holsinger 1978). In Vermont, this species was found in a small cave of marble bedrock with a deep (probably > 9 meters) pool of water with a silt and/or sand bottom.

### Threats

The potential threats to the Taconic Cave Amphipod are groundwater pollution and use. For example, springhouses where rare species have been found are often on private property and subject to owner discretion. If the spring outlets are dammed to create a pond for irrigation, livestock, or aesthetic reasons, this hydrologic alteration could be detrimental to the rare species population.

### References

Holsinger, J. R. 1978. Systematics of the subterranean amphipod genus *Stygobromus* (Crangonyctidae), Part II: Species of the eastern United States. *Smithsonian Contributions to Zoology* No. 266: 110-113.



Smith, D. G. 1986 (1984-1985). The occurrence of the troglobitic amphipod, *Stygobromis tenuis tenuis* (Smith) (Crangonyctidae) in the Taconic Mountains of southwestern Massachusetts (USA): a case for the existence of a subterranean refugium in a glaciated region. *International Journal of Speleology* 14: 31-37.

Smith, D. G. 1997. An annotated checklist of Malacostracans (Crustacea) inhabiting southern New England fresh waters. *Journal of Freshwater Ecology* 12 (2): 217-223.

## Piedmont Groundwater Amphipod (*Stygobromus tenuis tenuis*, State Special Concern)

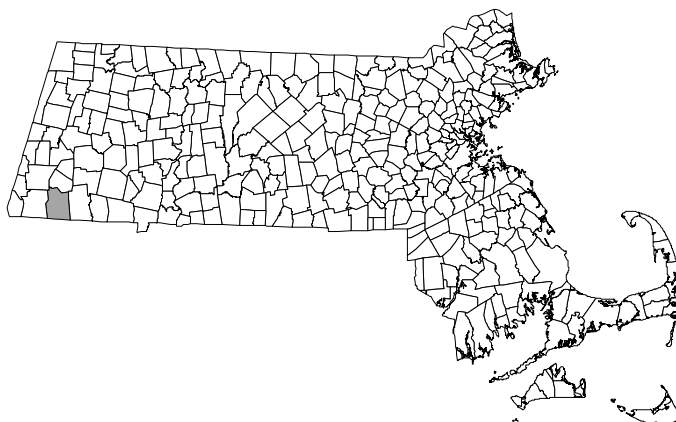
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4G5T2T3Q	S1	Springs, Caves & Mines	State List; Globally Rare

### Species Description

The Piedmont Groundwater Amphipod is one of two subterranean crustaceans in Massachusetts. This amphipod looks like a small flat shrimp; it has no eyes, and is whitish, creamy, or straw-colored. Adults in Massachusetts range in size from 5.5 mm to 9.5 mm (Smith 2000).

### Distribution and Abundance

In Massachusetts the known range of this species is limited. It is only found in one area in the extreme southern Taconic Mountains in southwestern Massachusetts. Historically, it is known only from groundwater habitats in eastern Maryland, extreme southeastern New York, and south central Connecticut. There have been two occurrences of Piedmont Groundwater Amphipod documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Piedmont Groundwater Amphipod

### Habitat Description

The Piedmont Groundwater Amphipod is found in upland karst terrain, which is a limestone area with underground caverns and streams. This species is found in springs connected with deep aquifers in the extreme southern Taconic Mountains in southwestern Massachusetts (Smith 1986). This habitat is unlike that described for this species elsewhere in its range (Holsinger 1967, 1978), where it is found in shallow groundwater habitats, including wells, seeps, and small springs.

### Threats

Potential threats to the Piedmont Groundwater Amphipod are groundwater contamination and use. For example, springhouses where rare species have been found are often on private property and subject to owner discretion. If the spring outlets were dammed to create a pond for irrigation, livestock, or aesthetic reasons, this hydrologic alteration could be detrimental to the rare species population.

### References

Holsinger, J. R. 1967. Systematics, speciation, and the distribution of the subterranean amphipod genus *Stygonectes* (Gammaridae). *Bulletin United States National Museum* 259: 1-176.

Holsinger, J.R. 1978. Systematics of the subterranean amphipod genus *Stygobromus* (Crangonyctidae), part II: Species of the eastern United States. *Smithsonian Contributions Zoology*. No 266. 144 pp.

Smith, D. G. 1986 (1984-1985). The occurrence of the troglobitic amphipod, *Stygobromus tenuis tenuis* (Smith) (Crangonyctidae) in the Taconic Mountains of southwestern Massachusetts (USA): a case for the existence of a subterranean refugium in a glaciated region. *International Journal of Speleology* 14: 31-37.

Smith, D.G. 2000. Keys to the Freshwater Macroinvertebrates of southern New England. Published by author. Sunderland, MA. 243 pp.

## Coastal Swamp Amphipod (*Synurella chamberlaini*, State Special concern)

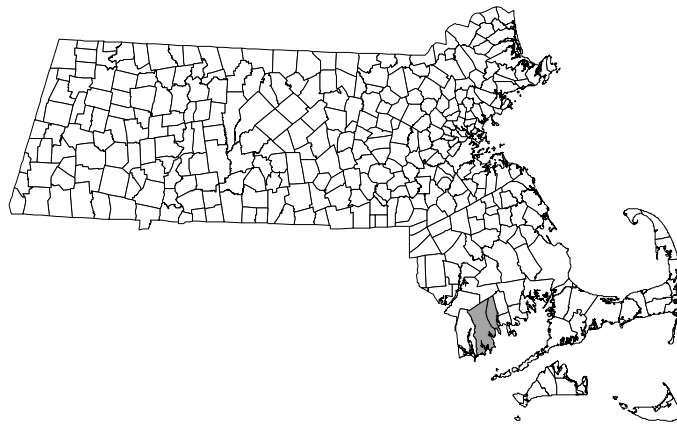
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G?	S1	Forested Swamps	State List

### Species Description

The Coastal Swamp Amphipod is a laterally compressed, many-segmented freshwater crustacean that looks like a small, flat shrimp. Its head has two pairs of antennae, a pair of eyes, and is fused to the first of seven thoracic segments. Each thoracic segment, as well as the six abdominal segments, has a pair of legs and/or gills that aid in respiration and locomotion. The Coastal Swamp Amphipod is orange in color with a green tinge. Mature females range in length from 8.0 to 11.5 mm and males from 4.8 to 8.5 mm (Smith 1987).

### Distribution and Abundance

In Massachusetts, the Coastal Swamp Amphipod is known from locations in Dartmouth and New Bedford. In New England, there are records from southeastern Maine, Rhode Island, and eastern Connecticut. Its range also extends south from Maryland to South Carolina along the Middle Atlantic Coastal Plain (Holsinger 1972). There have been five occurrences of the Coastal Swamp Amphipod documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Coastal Swamp Amphipod

### Habitat Description

In Massachusetts, the Coastal Swamp Amphipod is found in heavily vegetated, low-gradient, coastal wetland outlet streams of red maple and white cedar swamps in the Buzzards Bay moraine deposits (Smith 1987). This species can also be found in emergent marshes adjacent to these outlet streams. Elsewhere, the Coastal Swamp Amphipod is known from small streams, bogs, ponds, and ditches (Holsinger 1972).

### Threats

Habitat alterations such as draining, filling or destruction of coastal wetland swamps are potential threats to this species. Highway runoff is a specific threat to one of the known populations in Massachusetts.

### References

Holsinger, J. R. 1972. The freshwater amphipod crustaceans (Gammaridae) of North America. United States Environmental Protection Agency. Biota of Freshwater Ecosystems. Identification Manual 5: 1-89.

Smith, D. G. 1987. The genus *Synurella* in New England (Amphipoda, Crangonyctidae). *Crustaceana* 53 (3): 304-306.

## Feminine Clam Shrimp (*Caenestheriella gynecia*, no state status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G1G2	SNR	Vernal Pools	Globally Rare

### Species Description

The Feminine Clam Shrimp is a tiny (up to c. 13 mm total carapace length) branchiopod (Order: Spinicaudata, Family: Cyzicidae). It is aptly named, as it indeed looks like a clam with a shrimp inside. The carapace is tan in color and the animal is pale with dark eyes. Only females of this species have been described. Specimens collected in Massachusetts conformed to *C. gynecia*, however with demonstrated variability between two recognized genera, *Cyzicus* and *Caenestheriella*.

### Distribution and Abundance

The Feminine Clam Shrimp has been collected from Ohio, Pennsylvania, and Massachusetts. In Massachusetts, it is known from two sites in Berkshire County, one in Lenox and one in Pittsfield. It is possible that the Massachusetts populations were transported by off-road vehicles from Ohio or Pennsylvania, as in Massachusetts this species has only been found in pools that were enlarged by off-road vehicles (Smith and Gola 2001).

### Habitat Description

This is a vernal pool species. In Massachusetts, Feminine Clam Shrimps were found in shaded, large vernal pools. They live just within the surface muck, occasionally making brief, erratic, movements through the water column before settling back into the muck.

### Threats

The major threat to this species is the loss of wetland habitat to draining, development, and other causes. Before this species is considered a conservation target in Massachusetts, surveys should be performed to determine persistence of the two recorded populations and likelihood of endemism.

### Reference

Smith, D. G. and A. A. Gola. 2001. The Discovery of *Caenestheriella gynecia* Mattox 1950 (Branchiopoda, Cyzicidae) in New England, with Ecological and Systematic Notes. *Northeastern Naturalist* 8(4): 443-454.

## **J. Dragonflies and Damselflies**

## Spatterdock Darner (*Aeshna mutata*, State Special Concern)

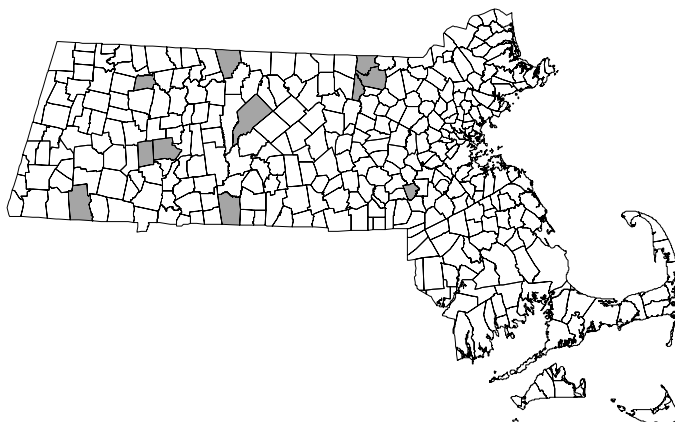
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S3	Vernal Pools, Lakes & Ponds, Coastal Plain Ponds	State List; Globally Rare

### Species Description

The Spatterdock Darner is a stunning insect in the order Odonata, suborder Anisoptera (the dragonflies), and family Aeshnidae (the darners). The adult is a large dragonfly magnificently colored with intense blues and rich browns. The thorax is mostly brown, with two pale lateral stripes, and the abdomen is predominantly brown and marked with sky-blue. The Spatterdock Darner has black legs and transparent to amber-tinged wings. The face is light blue, and the eyes are a brilliant deep blue in mature individuals. The first two abdominal segments are swollen while the third is constricted, giving the insect a slender-waisted appearance. Spatterdock Darners range from 2.6 to almost 3 inches (67 - 75 mm) in overall length, with the females averaging somewhat larger. Wingspread ranges from 3.5 to 3.9 inches (90 - 100mm).

### Distribution and Abundance

There have been 23 occurrences of Spatterdock Darner documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Spatterdock Darner

### Habitat Description

Typical habitat in Massachusetts seems to be boggy ponds with considerable emergent and floating vegetation. It has also been found in more ephemeral wetlands. As its common name implies, Spatterdock Darners are associated with spatterdock (*Nuphar* spp.). However, this plant is absent from some Massachusetts sites where the Spatterdock Darner is found. The nymphs are aquatic, living among aquatic vegetation and debris of the boggy ponds. The adults inhabit wooded uplands and clearings.

### Threats

Most Spatterdock Darner sites in Massachusetts are small and presumably fragile wetlands. The greatest threat to this species is likely to be the destruction or degradation of these wetlands from development, or the impacts of pollution resulting from inadequate sewage treatment, road run-off, or acidic precipitation on the eggs and nymphs. Water draw-down due to reduction of the water table for human use may also adversely affect Spatterdock Darners.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Spatterdock Darner Dragonfly (*Aeshna mutata*) Fact Sheet.

## Subarctic Darner (*Aeshna subarctica*, State Threatened)

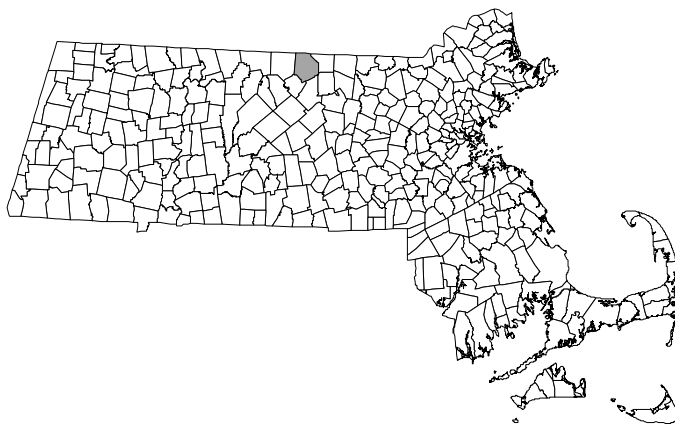
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Peatlands	State List

### Species Description

The Subarctic Darner is a stunning insect species in the order Odonata, suborder Anisoptera (the dragonflies), and family Aeshnidae (the darners). The adult is a large dragonfly magnificently colored with greens, blues, and rich browns. The thorax is mostly brown, with two green to blue dorsal stripes and two blue-green to yellowish lateral stripes. The abdominal segments are predominantly brown with green to blue markings. The Subarctic Darner has black legs and transparent to amber-tinged wings. The face is yellow with a thin black cross-line, and the eyes are dull blue-gray to green in color. Subarctic Darners range from 2.6 to almost 3 inches (66 - 76 mm) in overall length, with the females averaging somewhat larger. Wingspread ranges from 3.1 to 3.6 inches (78 – 92 mm).

### Distribution and Abundance

There have been two occurrences of Subarctic Darner documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Subarctic Darner

### Habitat Description

Subarctic Darners inhabit sphagnum bogs and deep fens with wet sphagnum. The nymphs are aquatic, living in soupy sphagnum pools and among aquatic vegetation. The adults inhabit wooded uplands and clearings.

### Threats

The greatest threat to this species is likely to be the destruction or degradation of wetlands from development and the impacts of pollution resulting from road run-off. As Subarctic Darner, like many species of dragonflies, spend a period of several days or more after emergence maturing in areas away from wetlands, it is important to maintain upland habitats adjoining the breeding sites for roosting and hunting. Without protected uplands, the delicate newly emerged adults are more susceptible to predation and mortality from inclement weather.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Subarctic Darner Dragonfly (*Aeshna subarctica*) Fact Sheet.



## Comet Darner (*Anax longipes*, State Special Concern)

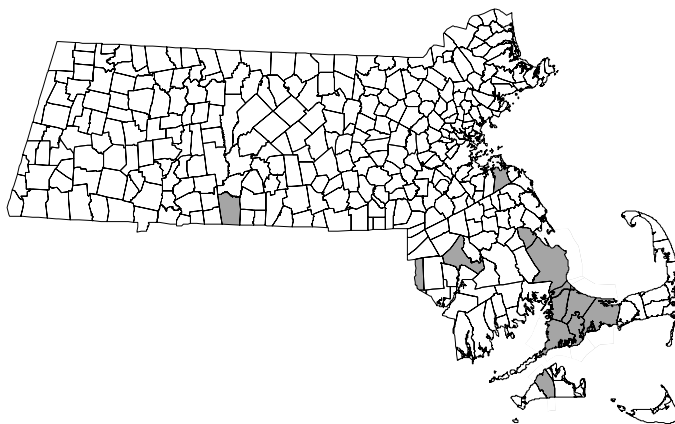
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Coastal Plain Ponds, Lakes & Ponds	State List

### Species Description

The Comet Darner is a stunning insect species in the order Odonata, suborder Anisoptera (the dragonflies), and family Aeshnidae (the darners). It is a large dragonfly with a bright red abdomen and bright green thorax. The first two abdominal segments are swollen and the third is constricted, giving the insect a slender-waisted appearance. The Comet Darner has long red legs that fade to black towards their ends. The wings are transparent and usually clear, though they can be tinged with amber. The face is bright green and unmarked. The compound eyes are green in mature males, but sky blue in females. Comet Darners are very large dragonflies ranging from 3.0 to almost 3.4 inches (75 - 87 mm) in overall length, with the females averaging somewhat larger. Wingspread may be over four inches (107 mm).

### Distribution and Abundance

There have been 49 occurrences of Comet Darner documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Comet Darner

### Habitat Description

Typical habitat in Massachusetts is ponds containing floating and emergent vegetation, including Coastal Plain Ponds. These ponds generally have yearly fluctuations in water level. Some of the common plants associated with coastal plain ponds include Military Rush (*Juncus militaris*), Plymouth Gentian (*Sabatia kennedyana*), and grasses (*Dicanthelium* spp.). The nymphs are aquatic, living among aquatic vegetation and debris. The adults inhabit a wide range of uplands, being found far from natal sites.

### Threats

The major threat to the Comet Darner is most likely the destruction of its breeding habitat, including construction and development near ponds; artificial drawdown of water levels by pumping stations; recreational use such as off-road vehicle traffic through pond shores; and eutrophication from leaching of septic tanks. It is also important to preserve the upland habitats surrounding the ponds, as Comet Darners, like many species of dragonflies, spend a period of up to several weeks away from the pond maturing after emergence.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Comet Darner Dragonfly (*Anax longipes*) Fact Sheet.

## Ocellated Darner (*Boyeria grafiana*, State Special Concern)

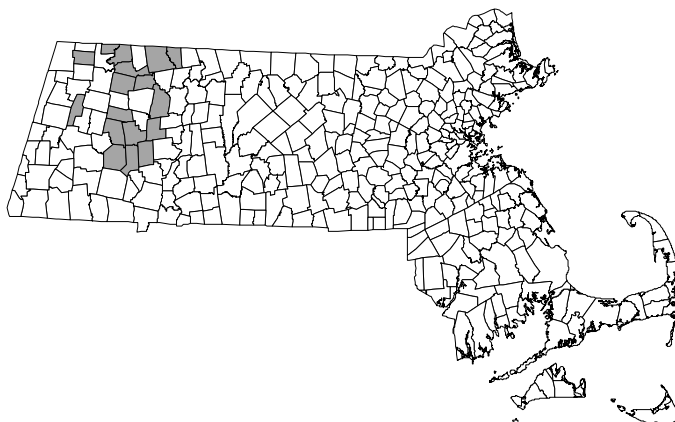
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2S3	Large & Mid-sized Rivers, Small Streams, Riparian Forest	State List

### Species Description

The Ocellated Darner is a large, semi-aquatic insect of the order Odonata, suborder Anisoptera (the dragonflies), and family Aeshnidae (the darners). The Ocellated Darner is dull brown overall, with two yellow or greenish spots on the sides of the thorax and green or greenish-yellow stripes on the top of the thorax. The abdomen is marked with small, dull green to yellow lateral markings. The sexes are similar in appearance, though the pale markings tend to be somewhat brighter and more distinct on males. Both males and females have long, ovate terminal appendages. Ocellated Darners range from about 2.4 to 2.6 inches (60 - 66 mm) in overall length, with a wingspan averaging approximately 3.4 inches (84 - 88 mm).

### Distribution and Abundance

There have been 18 occurrences of Ocellated Darner documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Ocellated Darner

### Habitat Description

Ocellated Darners nymphs inhabit clear, shallow, rocky, swift-flowing streams and large, rocky, poorly vegetated lakes. Adults also inhabit nearby uplands, often forests with mixed coniferous and deciduous trees. In Massachusetts, Ocellated Darners have been found only in shaded, clear, cold, rocky streams and rivers.

### Threats

As with most odonate species, water quality is of primary concern to the well-being of Ocellated Darners. Although the known Massachusetts sites seem to be fairly well-protected, many of these rivers are paralleled by roadways for much of their length, and salt and other road contaminant run-off is of concern. Siltation from construction or erosion may also cause problems. Low-level recreational use from fisherman and canoeists probably has little impact on odonate populations, but should be monitored. The upland borders of these river systems are also crucial to the well-being of odonate populations as they are critical for feeding, resting, and maturation. Development of these areas should be discouraged, and the preservation of remaining undeveloped uplands should be a priority.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Ocellated Darner Dragonfly (*Boyeria grafiana*) Fact Sheet.

## Spine-crowned Clubtail (*Gomphus abbreviatus*, State Endangered)

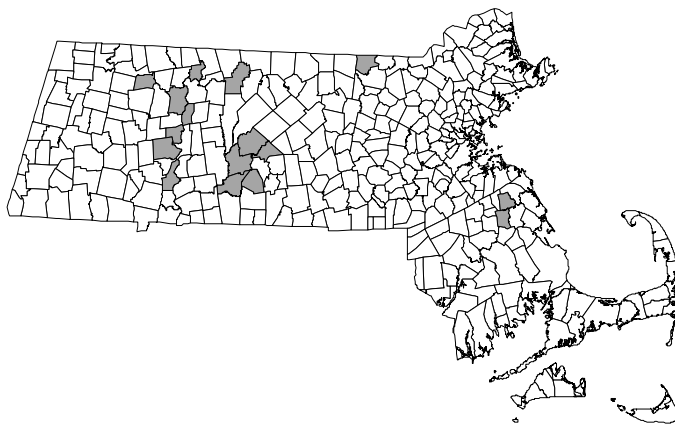
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S2	Large & Mid-sized Rivers, Riparian Forest	State List; Globally Rare

### Species Description

The Spine-Crowned Clubtail is a large, semi-aquatic insect in the order Odonata, suborder Anisoptera (the dragonflies). The Spine-Crowned Clubtail is in the subgenus *Hylogomphus*, a group with medium-sized clubs on the tips of the abdomens. Spine-Crowned Clubtails are dark brown/black dragonflies with pale to bright yellow markings on the body and green eyes. The top of the thorax is marked with thick, pale stripes and there are broad, pale, lateral stripes on the sides of the thorax. The pale thoracic markings are bright yellow in the young adults, becoming somewhat duller as the insect matures. The dark abdomen has yellow markings on top of segments one through seven (odonate abdomens have 10 segments) and small yellow spots on the sides of those segments that form an incomplete ring at the base of each segment. There are two large bright yellow patches on each side of the club. The face is dull to bright yellowish with no markings, and the legs are black. The sexes are similar in appearance, though the females have thicker abdomens and a less developed, though still prominent, club. Adult Spine-Crowned Clubtails range in length from 1.3 to 1.4 inches (34 mm - 35 mm), with a wingspan averaging 2.6 inches (66 mm). The fully developed nymphs average just under one inch in length (23 mm - 24 mm).

### Distribution and Abundance

There have been 14 occurrences of Spine-crowned Clubtail documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Spine-crowned Clubtail

### Habitat Description

Spine-Crowned Clubtails inhabit large streams and rivers. In Massachusetts, they have been found on medium-sized to large rivers with silty and sandy bottoms, including the Connecticut River. The nymphs are aquatic and burrow just under the sediment of the river bottom. The adults inhabit the riparian areas, forested uplands, and fields.

### Threats

As for many rare odonate species, the exact management needs of Spine-Crowned Clubtails are not known. Water quality is a primary concern. Potential threats to the water quality of the rivers inhabited by this species include industrial pollution and sewage overflow, salt and other road contaminant run-off, and siltation from construction or erosion. The disruption of natural flooding regimes by dams and water diversion projects may have a negative impact on odonate populations. Extensive use of these rivers by power boats and jet skis is a serious concern, particularly during the early summer emergence period of Spine-Crowned Clubtails. Many species of clubtails, and

other riverine odonates, undergo their emergence a short distance from the water surface on exposed rocks or vegetation or on river banks, where they are imperiled by the wakes of high-speed watercraft. Low-level recreational use from fishermen and canoeists probably has little impact on odonate populations, but should be monitored. The upland borders of these river systems are also crucial to the well-being of odonate populations as they are critical for feeding, resting, and maturation. Development of these areas should be discouraged and preservation of the remaining undeveloped uplands bordering the rivers should be a top priority.

## **Reference**

Massachusetts Natural Heritage & Endangered Species Program. 2003. Spine-crowned Clubtail Dragonfly (*Gomphus abbreviatus*) Fact Sheet.

## Harpoon Clubtail (*Gomphus desertus*, State Endangered)

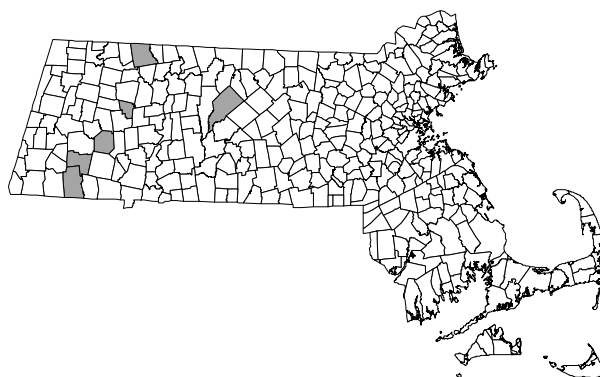
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S2	Large & Mid-sized Rivers, Riparian Forest	State List

### Species Description

The Harpoon Clubtail is a large, slender insect belonging to the order Odonata, suborder Anisoptera (the dragonflies). The Harpoon Clubtail belongs to the sub-genus *Phanogomphus*. These clubtails are characterized by their dull coloring of grays, greens, browns and blacks, and by their small “club.” Harpoon Clubtails have a plain gray-green face and eyes that range in color from pale to deep aqua blue. The sides of the thorax are marked with three wide grayish-green stripes that almost completely cover the brown base color. The top of the thorax also has a base color of dark brown and is marked with two gray-green stripes. The abdomen is black. Segments 3 through 7 of the abdomen (dragonflies and damselflies have 10 abdominal segments) have thin grayish-green dorsal stripes that grow shorter towards the tip of the abdomen. Dorsally, segments 8 through 10 are entirely black, though they have gray-green to yellow patches on the sides. Recently emerged individuals are more brightly colored than mature individuals. Adult Harpoon Clubtails range from about 1.8 to 1.9 inches (46 to 49 mm) in length. Although the female is similar in coloration, she is more stout than the male, with a “club” that is even smaller than the male.

### Distribution and Abundance

There have been six occurrences of Harpoon Clubtail documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Harpoon Clubtail

### Habitat Description

The Harpoon Clubtail inhabits clear, cold streams with intermittent sections of rocks and rapids. The fast flow of these streams is interrupted here and there by pools below sections of rapids, where the aquatic nymphs burrow into the accumulated sand and gravel.

### Threats

As for many rare species, the exact management needs of the Harpoon Clubtail are not known. Alteration of water quality is certainly a threat to the maintenance of their populations in Massachusetts. Threats to water quality include industrial pollution and sewage overflow, and salts and other run-offs from roadways. Also, as an inhabitant of lotic habitats, this species may also be particularly vulnerable to alterations in water flow by damming or other water diversion. The upland borders of these river systems are also crucial to the well-being of odonate populations as they are critical for feeding, resting, and maturation. Development of these areas should be discouraged and preservation of the remaining undeveloped uplands bordering the river should be a top priority.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Harpoon Clubtail Dragonfly (*Gomphus desertus*) Fact Sheet.

## Midland Clubtail (*Gomphus fraternus*, State Endangered)

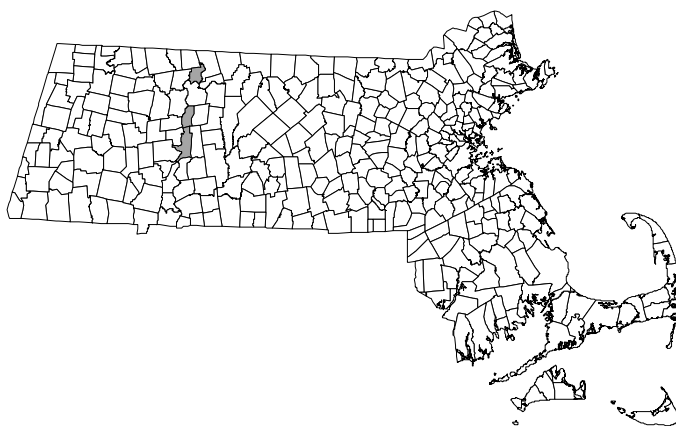
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Large & Mid-sized Rivers, Connecticut & Merrimack Mainstems, Riparian Forest	State List

### Species Description

The Midland Clubtail is a large, semi-aquatic insect in the order Odonata, suborder Anisoptera (the dragonflies). The Midland Clubtail is in the subgenus *Gomphurus*, a group of medium- to large-sized dragonflies characterized by having the broadest clubs of any of the Gomphidae. Midland Clubtails are dark brown dragonflies with pale yellow to greenish markings on the body and bright green eyes. The top of the thorax is marked with thick, pale stripes that form a rearward-facing U pattern. There are broad, pale, lateral stripes on the sides of the thorax. The pale thoracic markings are bright yellow in immatures but darken to a dull grayish-green in mature individuals. The dark abdomen has thin, yellow markings on the tops of segments one through eight, and yellow patches on the sides of the club. The face is plain, dull yellowish and the legs are blackish. The sexes are similar in appearance, though the females have thicker abdomens and a less developed, though still prominent, club. Adult Midland Clubtails range in length from 1.9 to 2.1 inches (48 mm - 54 mm), with a wingspan averaging 2.7 inches (68 mm). The fully developed nymphs average about 1.2 inches in length (29 mm - 31.5 mm).

### Distribution and Abundance

There have been three occurrences of Midland Clubtail documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Midland Clubtail

### Habitat Description

Midland Clubtails inhabit medium- to large-sized rivers and large, wind-swept lakes. They are known only from the Connecticut River in Massachusetts.

### Threats

As for many rare species, the exact management needs of Midland Clubtails are not known. With most odonates, water quality is critical to their well-being, and Midland Clubtails are undoubtedly no exception. Potential threats to the water quality of the Connecticut River include industrial and agricultural pollution, sewage overflow, salt and other road contaminant run-off, and siltation from construction or erosion. The impact of the disruption of natural flooding regimes by damming and water diversion projects on Midland Clubtails and other riverine species is unknown but may be considerable. Extensive use of the river by power boats and jet skis is a serious concern,

particularly during the early summer emergence period of Midland Clubtails (as well as of several other clubtail species). Many species of clubtails, as well as other riverine odonates, eclose low over the water surface on exposed rocks, emergent or floating vegetation, or steep sections of the river bank where they are imperiled by the wakes of high speed watercraft. Low-level recreational use from fisherman and canoeists probably has little impact on odonate populations, but should be monitored. The upland borders of these river systems are also crucial to the well-being of odonate populations as they are critical for feeding, resting, and maturation, particularly for the teneral adults. Development of these areas should be discouraged, and the preservation of remaining undeveloped uplands should be a top priority.

## **Reference**

Massachusetts Natural Heritage & Endangered Species Program. 2003. Midland Clubtail Dragonfly (*Gomphus fraternus*) Fact Sheet.

## Rapids Clubtail (*Gomphus quadricolor*, State Threatened)

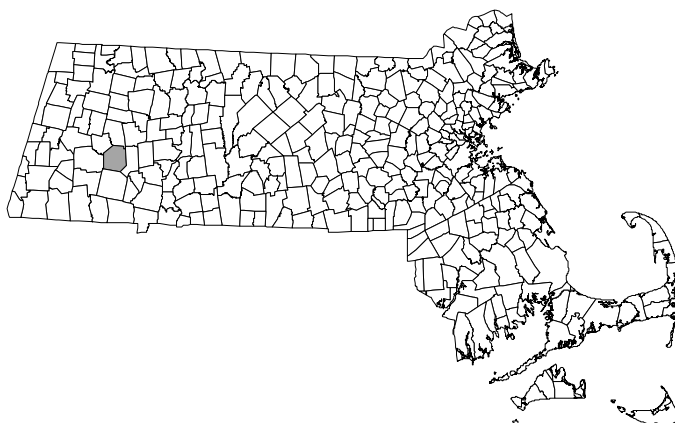
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S1	Large & Mid-sized Rivers, Connecticut & Merrimack Mainstems, Riparian Forest	State List; Globally Rare

### Species Description

The Rapids Clubtail (*Gomphus quadricolor*) is a large, slender insect belonging to the order Odonata, suborder Anisoptera (the dragonflies). The Rapids Clubtail belongs to the sub-genus *Phanogomphus*. These clubtails are characterized by their dull coloring of grays, greens, browns and blacks, and by their small “club.” Rapids Clubtails have blue-green eyes. The legs are black. The sides of the thorax are marked with yellow to gray-green dorsal and lateral stripes. The abdomen is black. Abdominal segments 1 through 7 have thin yellowish dorsal stripes that are shorter towards the tip of the abdomen. Recently emerged individuals are more brightly colored than mature individuals. Although the pattern is the same, the pale coloration can be bright yellow, instead of the dull gray-green of mature Rapids Clubtails. Adult Rapids Clubtails range from about 1.6 to 1.8 inches (42 to 45 mm) in length. Although the female is similar in coloration, she has more yellow on the abdomen. She is stouter overall with the exception of the “club”, which is smaller than that of the male.

### Distribution and Abundance

There have been two occurrences of Rapids Clubtail documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Rapids Clubtail

### Habitat Description

The Rapids Clubtail inhabits clear, cold streams and rivers with intermittent sections of rocks and rapids.

### Threats

As for many rare species, the exact management needs of the Rapids Clubtail are not known. Alteration of water quality is certainly a threat to the maintenance of their populations in Massachusetts. Threats to water quality include industrial and agricultural pollution, sewage overflow, and salts and other run-offs from roadways. Also, as an inhabitant of lotic habitats, this species may also be particularly vulnerable to alterations in water flow by damming or water diversion projects. The upland borders of these river systems are also crucial to the well-being of odonate populations as they are critical for feeding, resting, and maturation. Development of these areas should be discouraged and preservation of the remaining undeveloped upland bordering the river should be a top priority.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Rapids Clubtail Dragonfly (*Gomphus quadricolor*) Fact Sheet.



## Cobra Clubtail (*Gomphus vastus*, State Special Concern)

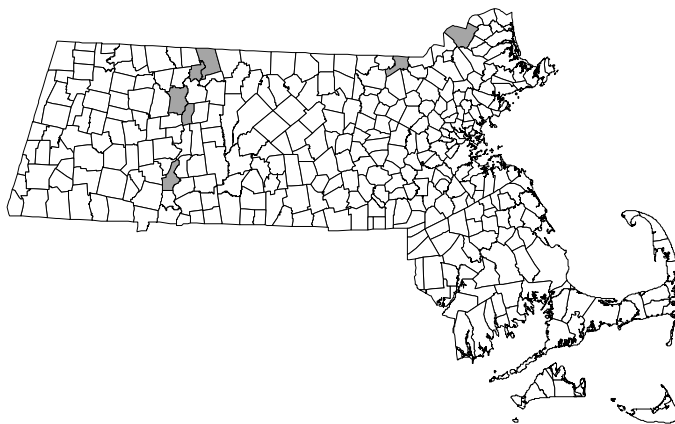
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Connecticut & Merrimack Mainstems, Riparian Forest	State List

### Species Description

The Cobra Clubtail is a large, semi-aquatic insect in the order Odonata, suborder Anisoptera (the dragonflies). The Cobra Clubtail is in the subgenus *Gomphurus*, a group characterized by having the broadest clubs of any of the Gomphidae. Cobra Clubtails are dark brown dragonflies with pale yellow to greenish markings on the body and bright green eyes. The top of the thorax is marked with thick, pale stripes that form a rearward-facing U pattern. There are broad, pale, lateral stripes on the sides of the thorax. The pale thoracic markings are bright yellow in the young adults, but become a dull, grayish-green as the insect matures. The dark abdomen has thin, yellow markings on the tops of segments one through seven and bright yellow patches on the sides of the club. The face is dull yellowish with dark horizontal striping, and the legs are black. The sexes are similar in appearance, though the females have thicker abdomens and a less developed, though still prominent club. Adult Cobra Clubtails range in length from 1.9 to 2.25 inches (47 mm - 57 mm), with a wingspan averaging 2.6 inches (66 mm). The fully developed nymphs average just over one inch in length (27 mm - 29.5 mm).

### Distribution and Abundance

There have been five occurrences of Cobra Clubtail documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Cobra Clubtail

### Habitat Description

Cobra Clubtails inhabit large, sandy-bottomed rivers and large, wind-swept lakes. In Massachusetts, they are found along the Connecticut and Merrimack Rivers.

### Threats

As for many rare species, the exact management needs of Cobra Clubtails are not known. With most odonates, water quality is critical to their well-being, and Cobra Clubtails are undoubtedly no exception. Potential threats to the water quality of the Connecticut and Merrimack Rivers include industrial and agricultural pollution, sewage overflow, salt and other road contaminant run-off, and siltation from construction or erosion. The impact of the disruption of natural flooding regimes by damming and water diversion projects on Cobra Clubtails and other riverine species is unknown but may be considerable. Extensive use of the river by power boats and jet skis is a serious concern, particularly during the early summer emergence period of Cobra Clubtails (as well as of several

other clubtail species). Many species of clubtails, as well as other riverine odonates, eclose low over the water surface on exposed rocks, emergent or floating vegetation, or steep sections of the river bank where they may be imperiled by the wakes of high-speed watercraft as well as by rapidly rising water levels, which swamp delicate emerging adults. Low-level recreational use from fisherman and canoeists probably has little impact on odonate populations, but should be monitored. The upland borders of these river systems are also crucial to the well-being of odonate populations as they are critical for feeding, resting, and maturation, particularly for the teneral adults. Development of these areas should be discouraged, and the preservation of remaining undeveloped uplands should be a top priority.

## **Reference**

Massachusetts Natural Heritage & Endangered Species Program. 2003. Cobra Clubtail Dragonfly (*Gomphus vastus*) Fact Sheet.

## Skillet Clubtail (*Gomphus ventricosus*, State Special Concern)

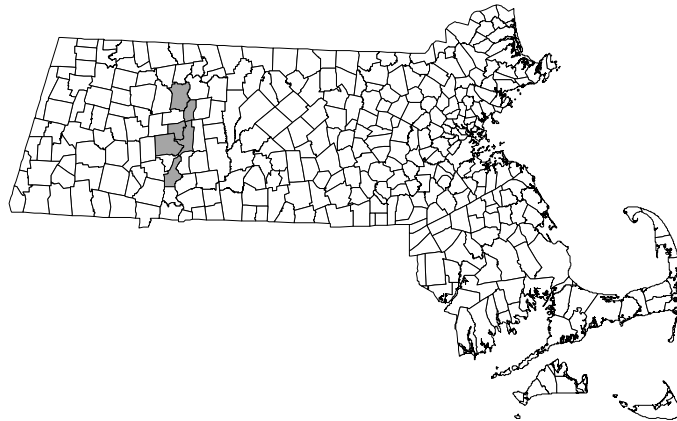
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S2	Large & Mid-sized Rivers, Connecticut & Merrimack Mainstems, Riparian Forest	State List

### Species Description

The Skillet Clubtail is a large, semi-aquatic insect in the order Odonata, suborder Anisoptera (the dragonflies). The Skillet Clubtail is in the subgenus *Gomphurus*, a group characterized by having the broadest clubs of any of the Gomphidae. Skillet Clubtails are dark brown dragonflies with pale yellow to greenish markings on the body and bright green eyes. The top of the thorax is marked with thick, pale stripes that form a rearward-facing U pattern. There are broad, pale, lateral stripes on the sides of the thorax. The pale thoracic markings are bright yellow in immatures, but become a dull grayish-green in mature individuals. The dark abdomen has thin, yellow markings on the tops of segments one through seven, and on the sides of the club. The face is plain, dull yellow and the legs are blackish. The sexes are similar in appearance, though the females have thicker abdomens and a less developed, though still prominent, club. Adult Skillet Clubtails range in length from 1.8 to 2.1 inches (45 mm - 53 mm), with a wingspan averaging 2.5 inches (63 mm).

### Distribution and Abundance

There have been eight occurrences of Skillet Clubtail documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Skillet Clubtail

### Habitat Description

Skillet Clubtails inhabit rivers of various sizes, but apparently have never been recorded in large numbers anywhere in Massachusetts.

### Threats

As for many rare species, the exact management needs of Skillet Clubtails are not known. With most odonates water quality is critical to their well-being, and Skillet Clubtails are undoubtedly no exception. Potential threats to water quality include industrial and agricultural pollution, sewage overflow, salt and other road contaminant run-off, and siltation from construction or erosion. The impact of the disruption of natural flooding regimes by damming and water diversion projects on Skillet Clubtails and other riverine species is unknown but may be considerable. Extensive use of the river by power boats and jet skis is a serious concern, particularly during the early summer emergence period of Skillet Clubtails. Many species of clubtails, as well as other riverine odonates, eclose low over the water surface on exposed rocks, emergent or floating vegetation, or steep sections of the river bank where they

are imperiled by the wakes of high-speed watercraft. Low-level recreational use from fishermen and canoeists probably has little impact on odonate populations, but should be monitored. The upland borders of these river systems are also crucial to the well-being of odonate populations as they are critical for feeding, resting, and maturation, particularly for the teneral adults. Development of these areas should be discouraged, and the preservation of remaining undeveloped uplands should be a top priority.

### **Reference**

Massachusetts Natural Heritage & Endangered Species Program. 2003. Skillet Clubtail Dragonfly (*Gomphus ventricosus*) Fact Sheet.

## Umber Shadowdragon (*Neurocordulia obsoleta*, State Special Concern)

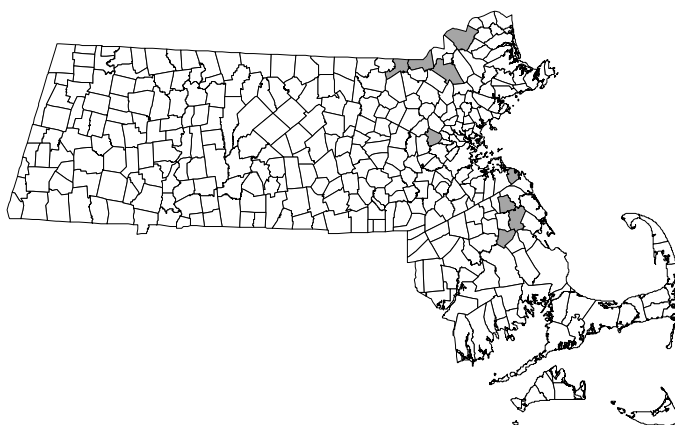
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S2	Lakes & Ponds, Large & Mid-sized Rivers, Connecticut & Merrimack Mainstems, Riparian Forests	State List

### Species Description

The Umber Shadowdragon (*Neurocordulia obsoleta*) is a large insect of the order Odonata and suborder Anisoptera (the dragonflies). The shadowdragons (genus *Neurocordulia*) belong to a family of dragonflies known as the emeralds (Corduliidae). Most emeralds are characterized by moderate pubescence (hairiness) on the thorax, brilliant green eyes in mature individuals, and metallic green highlights on the face, thorax and abdomen. Shadowdragons are one of the exceptions, being somber in coloration, with browns and dull yellows, and without metallic highlights or green eyes. The Umber Shadowdragon is a typical member of the genus with an overall chocolate brown coloration. The face is largely olive-brown with the lower section dull yellow. The large eyes, which meet at the top of the head, are brown to chestnut. The brown of this insect's hairy thorax is broken only by a pair of small, yet distinct, yellow markings located on the lower middle part of each side of the thorax. The tube-shaped abdomen is brown with yellow spots on each side of segments 4 through 8 (dragonflies and damselflies have 10 segments on their abdomen). There are no lateral spots on segment 9, though segment 10 is mostly yellow in color. The hind wings have a brown, triangular spot at their bases, while the forewings have a small rectangular shaped brown marking at the base of their wings. Also, there is a row of small brown spots that extend halfway out the leading edge of each wing, ending with a larger brown spot located at the nodus (the forward midpoint of each wing). Otherwise, the wings can be mostly clear to smoky brown (especially in older individuals). The Umber Shadowdragon is a strong flier. When at rest, it hangs vertically from the branch of a tree or bush, with wings held horizontally out from the body. Adult Umber Shadowdragons range from about 1.7 to 1.9 inches (43 to 48 mm) in length. Although male and female Umber Shadowdragons appear similar in their coloration, the female is more heavily built with a thicker abdomen, especially at the base.

### Distribution and Abundance

There have been six occurrences of Umber Shadowdragon documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Umber Shadowdragon

### Habitat Description

The Umber Shadowdragon is found on lakes of various sizes, and on medium to large rivers that are relatively unvegetated. They seem to do well in artificially created habitats, such as reservoirs and dammed sections of rivers, where they have been found in Massachusetts.

## **Threats**

As for many rare species, exact needs for management of the Umber Shadowdragon are not known. As an inhabitant of lakes, ponds, and rivers which are popular recreation spots for large numbers of people, the Umber Shadowdragon may be vulnerable to overuse of these habitats. Power boats creating increased wave action could affect these dragonflies as they emerge near the surface of the water and are very vulnerable. Also, as shorelines are converted to lawns and public beaches, Umber Shadowdragons and other dragonflies have fewer places they can safely emerge. Eutrophication and aquatic plant overgrowth in lentic habitats may also be a threat to this species. Umber Shadowdragons also may be vulnerable to chemical pollution and runoff from roadways. The upland borders of their aquatic habitats are also crucial to the well-being of odonate populations as they are critical for feeding, resting, and maturation. Development of these areas should be discouraged and preservation of the remaining undeveloped uplands bordering the river should be a top priority.

## **Reference**

Massachusetts Natural Heritage & Endangered Species Program. 2003. Umber Shadowdragon Dragonfly (*Neurocordulia obsoleta*) Fact Sheet.

## Stygian Shadowdragon (*Neurocordulia yamaskanensis*, State Special Concern)

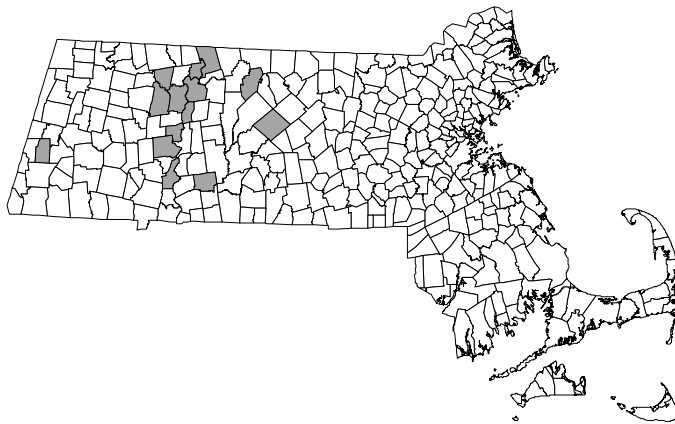
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Large & Mid-sized Rivers, Connecticut & Merrimack Mainstems, Riparian Forest	State List

### Species Description

The Stygian Shadowdragon (*Neurocordulia yamaskanensis*) is a large insect of the order Odonata and suborder Anisoptera (the dragonflies). The Shadowdragons belong to a family of dragonflies known as the emeralds (Corduliidae). Most emeralds are characterized by moderate pubescence (hairiness) on the thorax, brilliant green eyes in mature individuals, and metallic green highlights on the face, thorax and abdomen. Shadowdragons (genus *Neurocordulia*) are one of the exceptions, being somber in coloration, with browns and dull yellows, and without metallic highlights or green eyes. The Stygian Shadowdragon is a typical member of the genus with an overall chocolate brown coloration. The face is largely olive-brown and the large eyes, which meet at the top of the head, are brown to chestnut. The thorax is a deep olive brown. The tube-shaped abdomen is dark brown with dark yellow spots on each side of segments 4 through 8 (dragonflies and damselflies have 10 segments on their abdomen). With age, the abdomen becomes entirely dark. The hind wings have a brown, triangular spot at their bases, while the forewings have a small rectangular-shaped brown marking at the base of their wings. Otherwise, the wings are mostly clear to smoky brown (especially in older individuals). The Stygian Shadowdragon is a strong flier. When at rest, it hangs vertically from the branch of a tree or bush, with wings held horizontally out from the body. Adult Stygian Shadowdragons range from about 1.8 to 2.2 inches (45 to 55 mm) in length. Although male and female Stygian Shadowdragons appear similar in their coloration, the female is more heavily built with a thicker abdomen, especially at the base.

### Distribution and Abundance

There have been seven occurrences of Stygian Shadowdragon documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Stygian Shadowdragon

### Habitat Description

The Stygian Shadowdragon is found on lakes with rocky shores and on medium to large rivers that are relatively unvegetated. In Massachusetts, it is known only from rivers.

### Threats

As for many rare species, the exact management needs of Stygian Shadowdragons are not known. With most odonates, water quality is critical to their well-being, and Stygian Shadowdragons are undoubtedly no exception.

Potential threats to water quality include industrial and agricultural pollution, sewage overflow, salt and other road contaminant run-off, and siltation from construction or erosion. The impact of the disruption of natural flooding regimes by damming and water diversion projects on Stygian Shadowdragons and other riverine species is unknown but may be considerable. Extensive use of the river by power boats and jet skis is a serious concern, particularly during the early summer emergence period of Stygian Shadowdragons. Many riverine odonates eclose near the waterline where they are imperiled by the wakes of high speed watercraft and fluctuating water levels. The upland borders of these river systems are also crucial to the well-being of odonate populations as they are critical for feeding, resting, and maturation, particularly for the teneral adults. Development of these areas should be discouraged, and the preservation of remaining undeveloped uplands should be a top priority.

## **Reference**

Massachusetts Natural Heritage & Endangered Species Program. 2003. Stygian Shadowdragon Dragonfly (*Neurocordulia yamaskanensis*) Fact Sheet.



## Brook Snaketail (*Ophiogomphus aspersus*, State Special Concern)

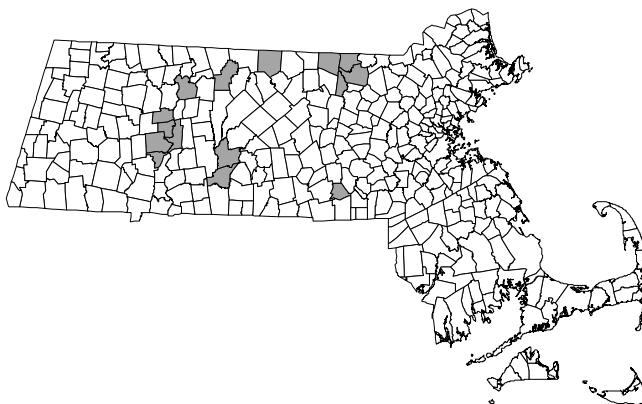
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S2S3	Large & Mid-sized Rivers, Riparian Forest	State List; Globally Rare

### Species Description

The Brook Snaketail is a large insect of the order Odonata and suborder Anisoptera (the dragonflies). Members of the genus *Ophiogomphus* (the snaketails), which includes the Brook Snaketail, are characterized by their brilliant green thorax, eyes, and face. The swelling in the abdomen of the Brook Snaketail forms a club that is over half the width of the thorax. Although the exact purpose of this swelling is not known, it might be used in courtship displays or to improve aerodynamics in flight. Each segment of the black abdomen is marked dorsally with a rearward-pointing, dagger-shaped, yellow marking. In addition, the sides of abdominal segments seven, eight and nine are marked with large yellow markings, accenting the “club.” The wings are clear, supported by a dense network of black veins. Brook Snaketails perch horizontally on rocks, logs, vegetation or the ground with their wings held horizontally, like those of an airplane. Adult Brook Snaketails range from about 1.7 to 1.8 inches (44 to 46 mm) in length. Although sexes are similar in coloration, the female is larger and has a much reduced “club” at the tip of her abdomen.

### Distribution and Abundance

There have been 13 occurrences of Brook Snaketail documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Brook Snaketail

### Habitat Description

Brook Snaketails can be found in clear, sand-bottomed streams with intermittent rapids, which often flow through dense woodland.

### Threats

As for many rare species, the exact management needs of the Brook Snaketail are not known. Alteration of water quality is certainly a threat to the maintenance of their populations in Massachusetts. Threats to water quality include industrial pollution, littering, and salts and other run-off from roadways. Also, as an inhabitant of fast-flowing streams, this species may also be particularly vulnerable to alterations in flow of the streams by damming or water diversion projects. The upland borders of these river systems are also crucial to the well-being of odonate populations as they are critical for feeding, resting, and maturation. Development of these areas should be discouraged and preservation of the remaining undeveloped upland bordering the river should be a top priority.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Brook Snaketail Dragonfly (*Ophiogomphus aspersus*) Fact Sheet.

## Riffle Snaketail (*Ophiogomphus carolus*, State Threatened)

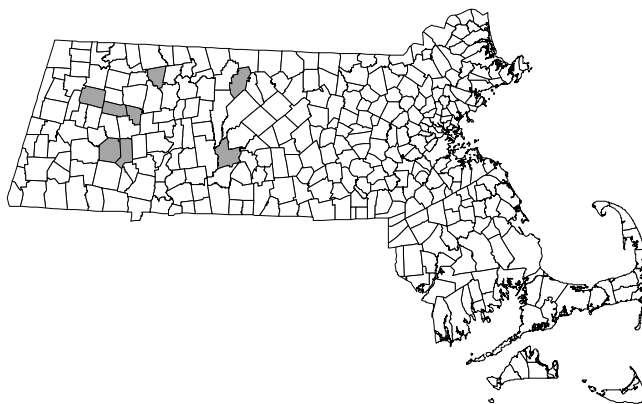
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Large & Mid-sized Rivers, Riparian Forest	State List

### Species Description

The Riffle Snaketail is a large, stocky insect belonging to the order Odonata, suborder Anisoptera (the dragonflies). The Riffle Snaketail is a member of the genus *Ophiogomphus* (the snaketails). These dragonflies are characterized by their brilliant green thorax, eyes, and face. The swelling in the abdomen of the Riffle Snaketail forms a club that is over half the width of the thorax. Although the exact purpose of this swelling is not known, it might be used in courtship displays or to improve aerodynamics in flight. The abdomen is black to dark brown with pale green to yellow markings down the sides, largest at the “club”. Also, there is a string of wide, yellow markings that run down the top of the abdomen. These markings resemble rearward-pointing daggers that are constricted in the middle. The wings are clear, supported by a dense network of black veins. Riffle Snaketails perch horizontally on rocks, logs, vegetation or the ground with their wings held horizontally, like those of an airplane. Adult Riffle Snaketails range from about 1.6 to 1.7 inches (41 to 44 mm) in length. Although the female is similar in coloration, she is larger than the male with a much reduced club near the tip of the abdomen.

### Distribution and Abundance

There have been ten occurrences of Riffle Snaketail documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Riffle Snaketail

### Habitat Description

Riffle Snaketails inhabit clear, cold, and rocky streams that are fast-flowing with relatively few pools. The bottom sediment is made up of fine gravel or sand in which the nymphs of the Riffle Snaketail burrow.

### Threats

As for many rare species, the exact management needs of the Riffle Snaketail are not known. Alteration of water quality is certainly a threat to the maintenance of their populations in Massachusetts. Threats to water quality include industrial pollution and salt and other run-off from roadways. Also, as an inhabitant of lotic habitats, this species may also be particularly vulnerable to alterations in stream flow damming or water diversion projects. The upland borders of these lotic systems are also crucial to the well-being of odonate populations as they are critical for feeding, resting, and maturation. Development of these areas should be discouraged and preservation of the remaining undeveloped upland bordering the river should be a top priority.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Riffle Snaketail Dragonfly (*Ophiogomphus carolus*) Fact Sheet.

## Ski-tailed Emerald (*Somatochlora elongata*, State Special Concern)

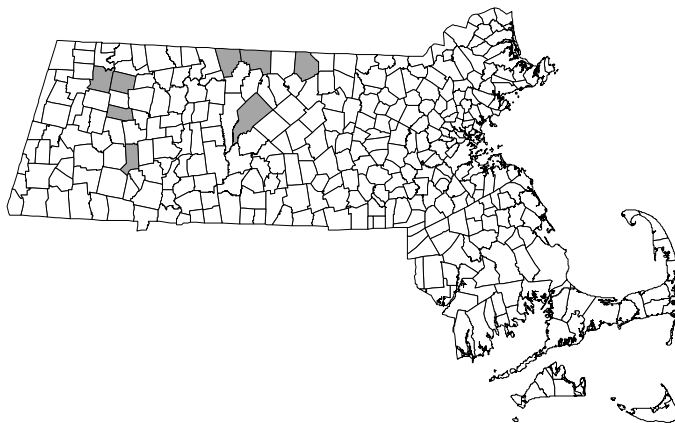
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Small Streams, Riparian Forest	State List

### Species Description

The Ski-tailed Emerald is a large, slender insect of the order Odonata, suborder Anisoptera (the dragonflies), family Corduliidae (the emeralds). Most emeralds of the genus *Somatochlora* are large and dark with at least some iridescent green coloration, brilliant green eyes in the mature adults (brown in young individuals), and moderate pubescence (hairiness), especially on the thorax. The Ski-tailed Emerald is distinctive among the *Somatochlora* of Massachusetts in its thoracic markings, which consist of an anterior stripe and a posterior spot on each side of the thorax. The thorax overall is a bronzy brown color with metallic green highlights throughout. The face is yellow with two dark brown cross bands, with the forehead a shimmering metallic green. The large eyes, which meet at a seam on the top of the head, are brilliant green in mature adults. The long and slender abdomen is most narrow at the base, widening to segment 5 (dragonflies and damselflies have 10 abdominal segments) and then narrowing slightly towards the distal end. The abdomen is black with a metallic green luster. The wings of this species are transparent and, as in all dragonflies and damselflies, supported by a dense system of dark veins. Adult male Ski-tailed Emeralds range from 2 to 2.2 inches (52 to 56 mm) in length. Females measure 58 to 62 mm (inches) in length. Although the females tend to be larger, male and female Ski-tailed Emeralds are similar in coloration and body form.

### Distribution and Abundance

There have been 11 occurrences of Ski-tailed Emerald documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Ski-tailed Emerald

### Habitat Description

In Massachusetts, the Ski-tailed Emerald has been found inhabiting small to medium-sized streams. Such streams may have a moderate or very sluggish flow and dense or little emergent vegetation. At several sites, Ski-tailed Emeralds have been found patrolling and ovipositing at the swelling of streams created in part by beaver dams. Elsewhere in its range, the Ski-tailed Emerald is said to occasionally inhabit highly vegetated ponds, though flowing waters appear to be a characteristic of normal Ski-tailed Emerald habitat.

### Threats

As for many rare species, the precise threats to the Ski-tailed Emerald are not known. As an inhabitant of streams, the Ski-tailed Emerald is vulnerable to habitat alteration such as damming and altering of flowage, along with many

other aquatic impacts such as chemical pollution and salt run-off from roadways. Overuse of streams for recreation (fishing, swimming, etc.) could cause problems if left unchecked. Also, these dragonflies, as almost all others, need natural uplands where they are protected and can mature and feed before returning to the water to breed.

**Reference**

Massachusetts Natural Heritage & Endangered Species Program. 2003. Ski-tailed Emerald Dragonfly (*Somatochlora elongata*) Fact Sheet.

## Forcipate Emerald (*Somatochlora forcipata*, State Special Concern)

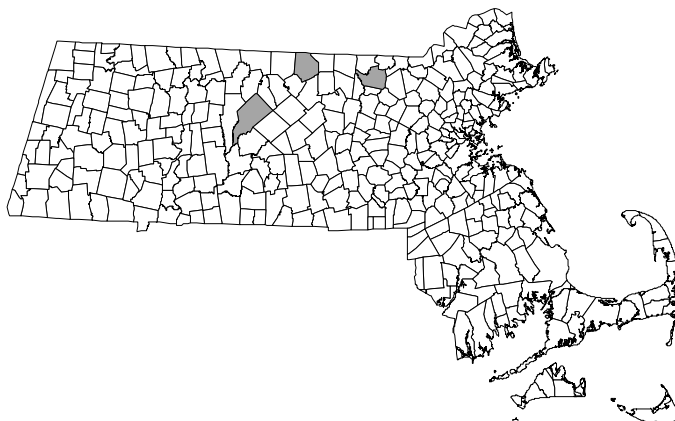
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1S2	Small Streams, Riparian Forest, Peatlands	State List

### Species Description

The Forcipate Emerald is a large, slender insect of the order Odonata, suborder Anisoptera (the dragonflies), family Corduliidae (the emeralds). Most emeralds of the genus *Somatochlora* are large and dark with at least some iridescent green coloration, brilliant green eyes in the mature adults (brown in young individuals), and moderate pubescence (hairiness), especially on the thorax. The Forcipate Emerald has thoracic markings consisting of two lateral yellow ovals, the front one more elongate, on each side of the thorax. The thorax overall is a bronzy brown color with metallic green highlights throughout. The face is yellow, with the forehead a dark brown with a hint of metallic green. The large eyes, which meet at a seam on the top of the head, are brilliant green in mature adults. The long and slender abdomen, black with a dull metallic green luster, is most narrow at the base, with a yellow lateral spot on segment 2, a pale basal ring on segment 3, and dull yellowish lateral spots on segments 5-7 and occasionally 8 (dragonflies and damselflies have 10 abdominal segments). The wings of this species are clear and, as in all dragonflies and damselflies, are supported by a dense system of dark veins. Adult Forcipate Emeralds range from 1.7 to 2 inches (43 to 51 mm) in length. Females are stockier and have a pale yellow ovipositor.

### Distribution and Abundance

There have been four occurrences of Forcipate Emerald documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Forcipate Emerald

### Habitat Description

The Forcipate Emerald inhabits pools in bogs and small forested streams.

### Threats

As for many rare species, the threats to the Forcipate Emerald are not well known. As an inhabitant of streams and bogs, the Forcipate Emerald is vulnerable to habitat alterations such as damming and altering of flowage, along with many other aquatic impacts such as chemical pollution and salt run-off from roadways. Bogs are very sensitive habitats, and can be impacted by trampling. Overuse of streams for recreation (fishing, swimming, etc.) could cause problems if left unchecked. The Forcipate Emerald and other dragonflies need natural uplands in which to mature and feed before returning to wetlands to breed.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Forcipate Emerald Dragonfly (*Somatochlora forcipata*) Fact Sheet.

## Coppery Emerald (*Somatochlora georgiana*, State Endangered)

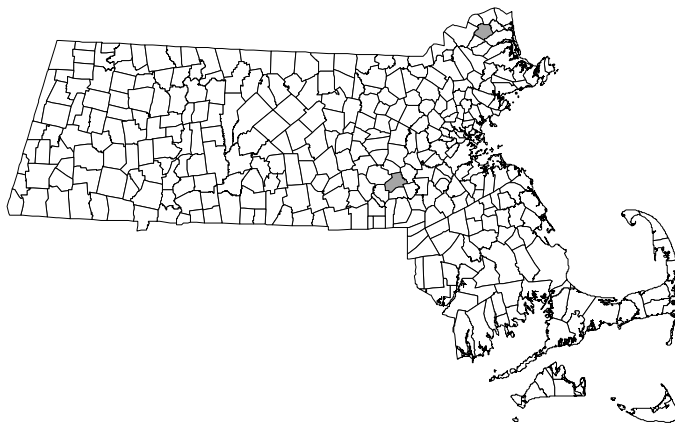
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S1	Small Streams, Riparian Forest, Peatlands	State List; Globally Rare

### Species Description

The Coppery Emerald is a large insect of the order Odonata, sub-order Anisoptera (the dragonflies), and family Corduliidae (the emeralds). Emeralds of the genus *Somatochlora* are generally large, dark dragonflies with at least some iridescent green coloration, brilliant green eyes in the mature adults (brown in young individuals), and moderate pubescence, especially on the thorax. The Coppery Emerald is distinctive among the *Somatochlora* in completely lacking the usual metallic coloration of the face, thorax and abdomen, and in the lack of green eyes, even in mature adults. The face and back of the head are pale brown in coloration, lighter on the face than on the back of the head. The large eyes, which meet at a seam on the top of the head, are chestnut-colored. The thorax is dull brown with two yellowish white stripes on each side of the thorax, which may become obscured with age. The slender, cylindrical abdomen is brownish yellow, darkening towards the tip to a reddish brown. The wings of this species are transparent and, as in all dragonflies and damselflies, are supported by a dense system of dark veins. The Coppery Emerald is a strong flier, as are all species of *Somatochlora*, and rarely perches. When it rests on the branch of a tree or bush hanging vertically, the wings are held horizontally out from the body like those of an airplane. Adult Coppery Emeralds range from 1.75 to 2 inches (45 to 49.5 mm) in length. Male and female Coppery Emeralds are similar in coloration and body form, though the females tend to be larger.

### Distribution and Abundance

There have been two occurrences of Coppery Emerald documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Coppery Emerald

### Habitat Description

In Massachusetts, the Coppery Emerald has been found breeding in a small, sluggish stream through a White Cedar (*Chamaecyparis thyoides*) swamp. However, it more often has been encountered away from breeding sites in open habitats, such as forest clearings and dirt roads, feeding in swarms with other *Somatochlora* and darners of the genus *Aeshna*.

### Threats

As for many rare species, the threats to the Coppery Emerald are not well known. As an inhabitant of small flowing streams, the Coppery Emerald, especially the nymph stage, is vulnerable to riverine impacts such as impoundment,

flow alteration, and chemical pollution. The adults may also be particularly vulnerable in upland areas away from the breeding site, where after emergence they spend up to a week feeding and maturing.

**Reference**

Massachusetts Natural Heritage & Endangered Species Program. 2003. Coppery Emerald Dragonfly (*Somatochlora georgiana*) Fact Sheet.

## Incurvate Emerald (*Somatochlora incurvata*, State Threatened)

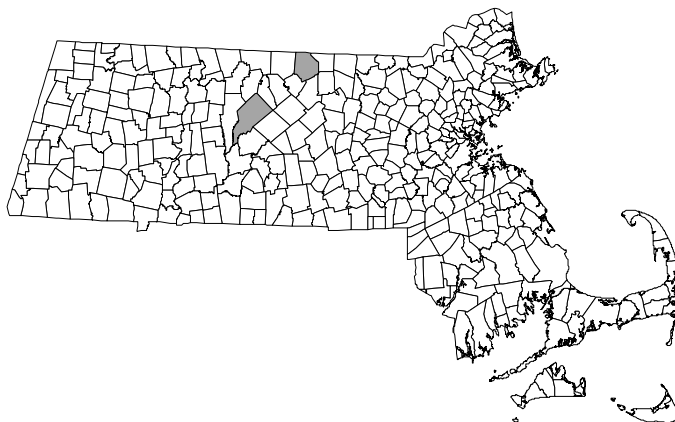
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1	Peatlands	State List

### Species Description

The Incurvate Emerald is a large, slender insect of the order Odonata, suborder Anisoptera (the dragonflies), family Corduliidae (the emeralds). Most emeralds of the genus *Somatochlora* are large and dark with at least some iridescent green coloration, brilliant green eyes in the mature adults (brown in young individuals), and moderate pubescence, especially on the thorax. Incurvate Emeralds have two indistinct yellowish ovals (which fade with age), the front one more elongate, on each side of the thorax. The thorax overall is a bronzy brown color with metallic green highlights throughout and long pale hairs. The face is very dark overall, with a bright yellow “upper lip”. The large eyes, which meet at a seam on the top of the head, are brilliant green in mature adults. The long and slender abdomen, black with a dull metallic green luster, is most narrow at the base, with a yellow lateral spot on segment 2, a pale basal ring on segment 3, and dull yellowish lateral spots on segments 4-8 (dragonflies and damselflies have 10 abdominal segments). The wings of this species are transparent and, as in all dragonflies and damselflies, are supported by a dense system of dark veins. Adult Incurvate Emeralds range from 1.9 to 2.3 inches (49 to 59 mm) in length. Females are stockier than males and have a pale yellow ovipositor.

### Distribution and Abundance

There have been two occurrences of Incurvate Emerald documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Incurvate Emerald

### Habitat Description

The Incurvate Emerald inhabits sphagnum bogs.

### Threats

As for many rare species, threats to the Incurvate Emerald are not well known. As an inhabitant of bogs, Incurvate Emerald is vulnerable to habitat alteration such as infilling and damming, along with many other aquatic impacts such as chemical pollution and salt run-off from roadways. Another important part of preserving this and other species of dragonflies is the maintenance of suitable upland habitat essential for the life cycle of dragonflies. Dragonflies need natural uplands in which to mature and feed before returning to wetlands to breed.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Incurvate Emerald Dragonfly (*Somatochlora incurvata*) Fact Sheet.



## Kennedy's Emerald (*Somatochlora kennedyi*, State Endangered)

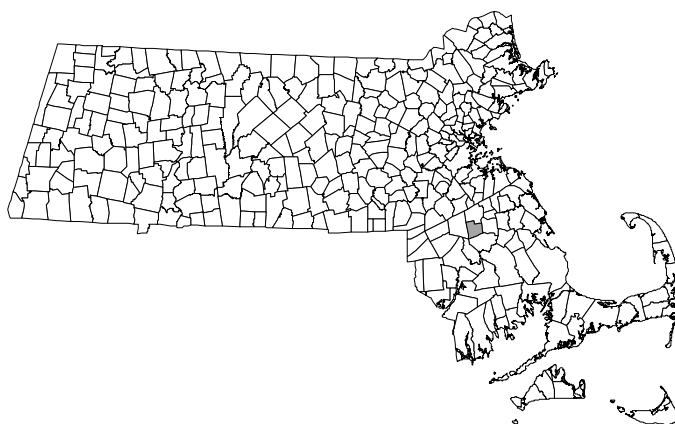
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Small Streams, Riparian Forest, Peatlands	State List

### Species Description

Kennedy's Emerald is a large, slender insect belonging to the order Odonata, sub-order Anisoptera (the dragonflies), and family Corduliidae (the emeralds). Emeralds of the genus *Somatochlora*, which includes Kennedy's Emerald, are generally large, dark dragonflies with at least some iridescent green coloration, brilliant green eyes in the mature adults (brown in young individuals), and moderate pubescence, especially on the thorax. The face of the Kennedy's Emerald is largely metallic green. The large eyes, which meet at a seam on the top of the head, are brilliant green in mature adults, brown in less mature individuals. Each side of the thorax is marked with two wide and indistinct pale stripes separated by thin lines of metallic green coloration. These stripes become increasingly dull with age. The top of the thorax is metallic green. The cylindrical abdomen is highly constricted at its base, widening to segment five (dragonflies and damselflies have 10 abdominal segments) and then narrowing slightly towards the distal end. The abdomen is black with a metallic green sheen. In the females, segments 1 and 2 have extensive yellow on the sides. The wings of this species are transparent and are supported by a dense system of dark veins. Adult Kennedy's Emeralds range from 2 to 2.2 inches (51 to 55 mm) in length. Male and female Kennedy's Emeralds are similar in coloration, though the female is larger.

### Distribution and Abundance

There has been one occurrence of Kennedy's Emerald documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Kennedy's Emerald

### Habitat Description

In Massachusetts, the Kennedy's Emerald has been found inhabiting small streams and Red Maple (*Acer rubrum*) swamps. Elsewhere in its range, Kennedy's Emerald is sometimes associated with streams flowing through open habitats, such as marshes and bogs.

### Threats

As for many rare species, the exact needs for management of Kennedy's Emerald are not known. As an inhabitant of streams, Kennedy's Emerald is vulnerable to habitat alteration such as damming and alterations to flow regimes, along with many other aquatic impacts such as chemical pollution and salt and other run-off from roadways. The upland borders of these river systems are also crucial to the well-being of odonate populations, as they are critical

for feeding, resting, and maturation. Development of these areas should be discouraged and preservation of the remaining undeveloped upland bordering the streams and swamps should be a top priority.

**Reference**

Massachusetts Natural Heritage & Endangered Species Program. 2003. Kennedy's Emerald Dragonfly (*Somatochlora kennedyi*) Fact Sheet.

## Mocha Emerald (*Somatochlora linearis*, State Special Concern)

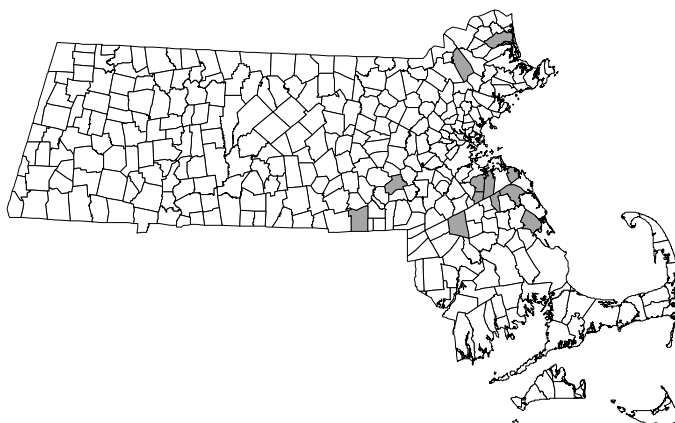
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Small Streams, Riparian Forest	State List

### Species Description

The Mocha Emerald is a large, elongate insect of the order Odonata, sub-order Anisoptera (the dragonflies), and family Corduliidae (the emeralds). Emeralds of the genus *Somatochlora* are generally large, dark dragonflies with at least some iridescent green coloration, brilliant green eyes in the mature adults (brown in young individuals), and moderate pubescence, especially on the thorax. The Mocha Emerald is distinctive among the *Somatochlora* of Massachusetts in completely lacking markings on the thorax. The face is mostly yellowish brown with a brown band across the middle. The forehead is metallic green. The large eyes, which meet at a seam on the top of the head, are brilliant green in mature adults. The thorax is a chocolate color (mocha) with some metallic green highlights. The cylindrical abdomen is most narrow at the base, widening to segment four (dragonflies and damselflies have ten abdominal segments) and then narrowing slightly toward the distal end. The abdomen is black with a brownish yellow lateral spot at the proximal end of segments three through ten. The first segment has a large brownish yellow spot also positioned laterally and proximally. The wings of this species are transparent, though washed with brown or amber color, usually more extensive in females. As in all dragonflies and damselflies, the wings are supported by a dense system of dark veins. When at rest, the Mocha Emerald hangs vertically from the branches of bushes and trees, with the wings extended out horizontally, like those of an airplane. Adult male Mocha Emeralds range from 2.3 to 2.4 inches (58.5 to 61 mm) in length. Females range from 2.6 to 2.7 inches (65.5 to 68.25 mm) in length. Although the females are larger, both sexes are similar in coloration and body form.

### Distribution and Abundance

There have been 12 occurrences of Mocha Emerald documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Mocha Emerald

### Habitat Description

In Massachusetts, the Mocha Emerald has been found most often in fields and forest clearings, away from breeding habitats. However, many of these areas are adjacent to habitats that, based on observations elsewhere in this species' range, are appropriate breeding sites for the Mocha Emerald. Breeding sites for this species are small to medium-sized streams that flow through woods or swamps. At one Massachusetts site, males were found patrolling over puddles along a wooded, dirt road. A sand or gravel bottom may be an important habitat characteristic, since females prefer to oviposit in this type of substrate.

**Threats**

As for many rare species, exact needs for management of the Mocha Emerald are not known. As an inhabitant of streams, the Mocha Emerald may be vulnerable to impacts such as damming and flow alteration. Other impacts on aquatic systems such as chemical pollution pose a threat to the Mocha Emerald. The adults may also be particularly vulnerable in upland areas away from the breeding site, where they spend up to a week feeding and maturing after emergence. Maintaining natural uplands for feeding and roosting is a key part of protection of this species.

**Reference**

Massachusetts Natural Heritage & Endangered Species Program. 2003. Mocha Emerald Dragonfly (*Somatochlora linearis*) Fact Sheet.

## Riverine Clubtail (*Stylurus amnicola*, State Endangered)

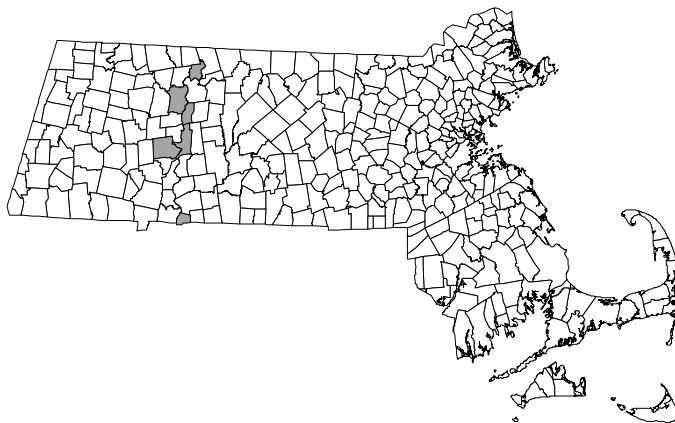
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1	Large & Mid-sized Rivers, Connecticut & Merrimack Mainstems, Riparian Forest	State List

### Species Description

The Riverine Clubtail is a large, semi-aquatic insect in the order Odonata, suborder Anisoptera (the dragonflies). The Riverine Clubtail is in the genus *Stylurus*, sometimes referred to as the “hanging clubtails”, a group characterized by having moderately flared clubs and relatively short legs. They typically perch on the top surface of leaves high in the tree tops, oriented in a more or less vertical position. Riverine Clubtails are dark brown to black in coloration with pale yellow to greenish markings on the body and bright green eyes. The top of the thorax is marked with thin, pale yellow or greenish stripes. The sides of the thorax are mostly pale with narrow dark markings. The pale thoracic markings are bright yellow in the young adults, but become a dull, grayish-green as the insect matures. The abdomen is black with small, yellow spots on the dorsal surface of segments one through eight, and large yellow patches on the sides of segments one, two, eight and nine. The face is dull yellowish-green, and the legs are blackish, but with distinct yellowish tibiae on the rear legs. The sexes are similar in appearance, though the females have thicker abdomens and a less developed club. Riverine Clubtails range in length from 1.7 to 1.9 inches (43-49 mm), with a wingspan averaging about 2.4 inches (62 mm). The nymphs average just over one inch in length (27.5-29 mm) when fully mature.

### Distribution and Abundance

There have been four occurrences of Riverine Clubtail documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Riverine Clubtail

### Habitat Description

Riverine Clubtails inhabit primarily medium to large rivers. In Massachusetts, they are found only in the Connecticut River.

### Threats

As for many rare species, the exact management needs of Riverine Clubtails are not known. Water quality certainly is a primary concern. Potential threats to the water quality of the Connecticut River include industrial pollution from businesses located along the river, salt and other road contaminant run-off, and siltation from construction or erosion. The disruption of natural flooding regimes by dams and water diversion projects also may have a negative impact on odonate populations. Extensive use of the river by power boats and jet skis is a serious concern,

particularly during the early summer emergence period of Riverine Clubtails. Many species of clubtails, and other riverine odonates, undergo their emergence low over the water surface on exposed rocks or vegetation, or exposed sections of the river bank, where they are imperiled by the wakes of high-speed watercraft. Low-level recreational use from fisherman and canoeists probably has little impact on odonate populations, but should be monitored. The upland borders of these river systems are also crucial to the well-being of odonate populations as they are critical for feeding, resting, and maturation. Development of these areas should be discouraged and preservation of the remaining undeveloped upland bordering the river should be a top priority.

## **Reference**

Massachusetts Natural Heritage & Endangered Species Program. 2003. Riverine Clubtail Dragonfly (*Stylurus amnicola*) Fact Sheet.

## Zebra Clubtail (*Stylurus scudderi*, State Endangered)

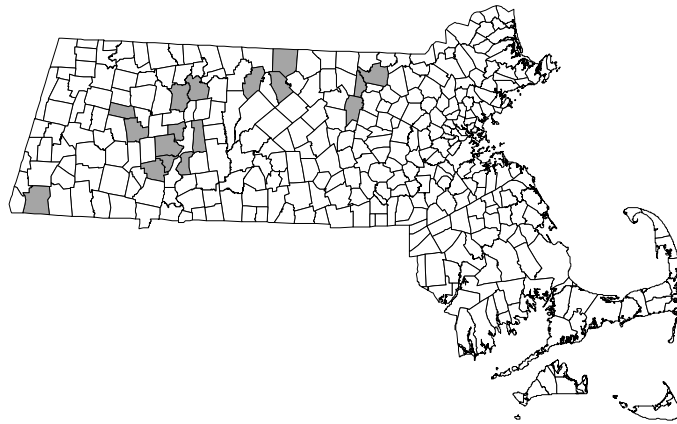
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S3	Large & Mid-sized Rivers, Riparian Forest	State List

### Species Description

The Zebra Clubtail is a large insect belonging to the order Odonata, sub-order Anisoptera (the dragonflies), and family Gomphidae (clubtails). The Zebra Clubtail possesses a rather wide club, nearly as wide as the thorax, which includes the seventh, eighth, and ninth segments (dragonflies and damselflies have ten abdominal segments). The Zebra Clubtail is a very striking insect with black and yellow patterning (which prompted its naming) and bright green eyes. The face is green with black cross stripes. The dark brown thorax has two large buff white stripes on each side. The black abdomen is marked with pale yellow rings. Abdominal segments eight and nine have a large yellowish spot located laterally on each side, while segment seven has a smaller spot in the same location. The three pairs of powerful legs are jet black and lined with spines which aid in catching the small aerial insects these insects feed on. Zebra Clubtails perch horizontally on rocks, logs, vegetation or the ground with their wings held horizontally, like those of an airplane. Adult Zebra Clubtails range from 2 to 2.3 inches (52 to 59 mm) in length. Although male and female Zebra Clubtails appear similar in their coloration, the female is slightly larger with a reduced "club."

### Distribution and Abundance

There have been 12 occurrences of Zebra Clubtail documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Zebra Clubtail

### Habitat Description

Zebra Clubtails inhabit medium-sized forested streams which usually have some intermittent rapids. These streams are generally sandy-bottomed with slow to moderate flow. Elsewhere within its range, the Zebra Clubtail has occasionally been found on large lakes.

### Threats

As for many rare species, the exact management needs of Zebra Clubtails are not known. Water quality certainly is a primary concern. Potential threats to the water quality of the rivers in which this species lives include industrial pollution from businesses located along the river, salt and other road contaminant run-off, and siltation from construction or erosion. The disruption of natural flooding regimes by dams and water diversion projects also may have a negative impact on odonate populations. Extensive use of the river by power boats and jet skis is a serious concern, particularly during the mid- to late-summer emergence period of Zebra Clubtails. Many species of

clubtails and other riverine odonates undergo emergence near the water on exposed rocks or vegetation, or exposed sections of the river bank, where they are imperiled by the wakes of high speed watercraft. Low-level recreational use from fisherman and canoeists probably has little impact on odonate populations, but should be monitored. The upland borders of these river systems are also crucial to the well-being of odonate populations as they are critical for feeding, resting, and maturation. Development of these areas should be discouraged and preservation of the remaining undeveloped upland bordering the river should be a top priority.

## **Reference**

Massachusetts Natural Heritage & Endangered Species Program. 2003. Zebra Clubtail Dragonfly (*Stylurus scudderi*) Fact Sheet.



## Arrow Clubtail (*Stylurus spiniceps*, State Threatened)

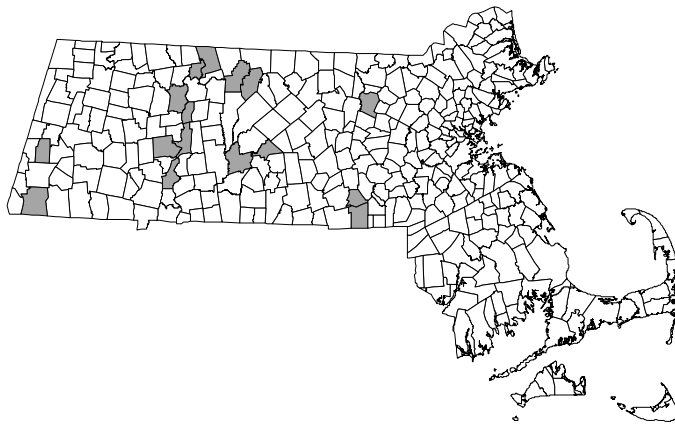
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Large & Mid-sized Rivers, Connecticut & Merrimack Mainstems, Riparian Forest	State List

### Species Description

The Arrow Clubtail is a large, semi-aquatic insect in the order Odonata, suborder Anisoptera (the dragonflies). The nymph is aquatic, and the adult terrestrial. Like all dragonflies, the adult Arrow Clubtail has a long, slender abdomen, four veined wings (two forewings and two hindwings), and a large head with huge eyes and powerful, chewing mouth parts. The Arrow Clubtail is in the genus *Stylurus*, the so-called “hanging clubtails”, a group characterized by having moderately flared clubs and relatively short legs. They typically perch high in the tree tops on the upper surface of leaves, in a vertical position. Arrow Clubtails are brownish in coloration with pale yellow to green markings on the body and bright green eyes. The top of the thorax is marked with thin, pale yellow or green stripes. The sides of the thorax are mostly pale, with narrow, dark lateral stripes. The pale thoracic markings are bright yellow in the young adults, but become a dull gray-green as the insect matures. The dark brown abdomen is unusually long for a clubtail, with a strikingly long ninth segment. The abdomen is marked with yellow spots on the dorsal surface and elongate yellow spots on the sides. The face is dull yellowish-brown, and the legs are black. The sexes are similar in appearance, though the females have thicker abdomens with only a slight swelling on segments eight and nine. Arrow Clubtails range in length from 2.1 to 2.55 inches (54 mm - 65 mm), with a wingspan averaging about 2.75 inches (70 mm). The males average somewhat larger than the females. The distinctive nymphs average about 1.5 inches in length (36 mm - 41 mm) when fully mature.

### Distribution and Abundance

There have been nine occurrences of Arrow Clubtail documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Arrow Clubtail

### Habitat Description

The nymphs of Arrow Clubtails inhabit medium to large, swift-flowing, sandy-bottomed rivers and occasionally large, wind-swept lakes. The adults inhabit riparian areas and the surrounding upland.

### Threats

As for many rare species, the exact management needs of Arrow Clubtails are not known. Water quality certainly is a primary concern. Potential threats to riverine water quality include industrial pollution from businesses located

along the rivers, salt and other road contaminant run-off, and siltation from construction or erosion. The disruption of natural flooding regimes by dams and water diversion projects also may have a negative impact on odonate populations. Extensive use of rivers by power boats and jet skis is a serious concern, particularly during the early summer emergence period of Arrow Clubtails. Many species of clubtails and other riverine odonates undergo emergence near the water on exposed rocks or vegetation, or exposed sections of the river bank, where they are imperiled by the wakes of high-speed watercraft. Low-level recreational use from fisherman and canoeists probably has little impact on odonate populations, but should be monitored. The upland borders of these river systems are also crucial to the well-being of odonate populations as they are critical for feeding, resting, and maturation. Development of these areas should be discouraged and preservation of the remaining undeveloped upland bordering the river should be a top priority.

## **Reference**

Massachusetts Natural Heritage & Endangered Species Program. 2003. Arrow Clubtail Dragonfly (*Stylurus spiniceps*) Fact Sheet.

## Ebony Boghaunter (*Williamsonia fletcheri*, State Endangered)

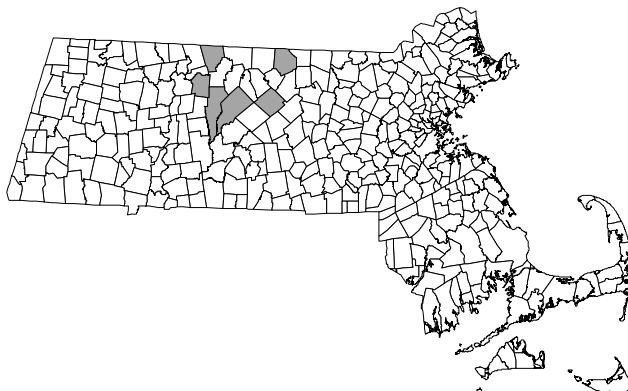
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S2	Peatlands	State List; Globally Rare

### Species Description

The Ebony Boghaunter is a small, delicately built, blackish dragonfly (order Odonata, sub-order Anisoptera). It is one of the smallest members of the emerald family (Corduliidae). Ebony Boghaunters are dull black in color, with bright green (male) or grey (female) eyes, a metallic brassy green frons (the prominent bulge on the front of the head), and a yellow-brown labium. The black abdomen has a pale yellow-white ring between the 2<sup>nd</sup> and 3<sup>rd</sup> abdominal segments (all Odonates have 10 abdominal segments), and a less conspicuous ring between the 3<sup>rd</sup> and 4<sup>th</sup> segments. Females are similar to the males, but have thicker abdomens, shorter terminal appendages at the tip of the abdomen, and are paler in coloration. Ebony Boghaunters range in length from 1.2 to 1.5 inches (32 to 34mm), with males averaging slightly larger. The wings are about 1.1 inches (22 mm) long and hyaline (transparent and colorless), except for a very small amber patch at the base. The nymph was undescribed until recently. When fully developed, the nymphs average about 0.6 inch (15 to 17mm) in length.

### Distribution and Abundance

There have been nine occurrences of Ebony Boghaunter documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Ebony Boghaunter

### Habitat Description

Ebony Boghaunters inhabit wet sphagnum bogs and swampy northern wetlands, often with soupy sphagnum pools, typically adjacent to coniferous or mixed coniferous/deciduous woodlands where the adults hunt and roost. Their specific habitat requirements, however, are not well understood, as they seem to be absent from many apparently suitable wetlands within the species' range.

### Threats

The primary threat to this species is habitat destruction through physical alteration or pollution. Artificial changes in water level and various forms of pollution, such as road and agricultural runoff, septic system failure, and insecticides, are all potential dangers. It is important to protect surrounding uplands, as they provide roosting, hunting, and mating habitat. In some portions of its range, the Ebony Boghaunter's habitat is under pressure from development, logging, and peat mining interests. However, in Massachusetts the known sites are mostly within protected land, much of it state-owned. The managers of these properties should be made aware of the presence of Ebony Boghaunters and advised of the species' requirements.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Ebony Boghaunter Dragonfly (*Williamsonia fletcheri*) Fact Sheet.

## Ringed Boghaunter (*Williamsonia lintneri*, State Endangered)

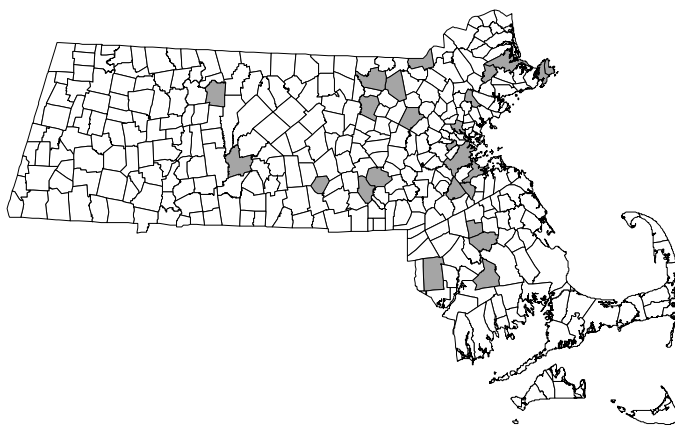
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S2	Peatlands	State List; Globally Rare

### Species Description

The Ringed Boghaunter is a small, delicately built dragonfly (order Odonata, suborder Anisoptera) in the family Corduliidae (the emeralds). It has a dark brown body, smoky blue-grey eyes, and pale orange-brown face and mouth parts. The most distinctive feature is a series of dull orange rings encircling all but the first and last of the ten abdominal segments. Females are similar to males, but have thicker abdomens and much shorter terminal appendages at the tip of the abdomen. Ringed Boghaunters are about 1.5 inches (3.4 cm) in length, of which almost two-thirds is abdomen. The wings are about one inch (2.2 cm) long and hyaline (transparent and colorless), except for a very small patch of amber at the base of the wings. Adults are most often seen along woodland trails near breeding sites on warm, sunny days, from late April to early June. However, their dark coloration and low flight habit makes them very inconspicuous, even in flight, and they are easily overlooked. The nymphs, which were undescribed until 1970, are about 0.7 inch in length (17-18mm) when fully developed.

### Distribution and Abundance

There have been 21 occurrences of Ringed Boghaunter documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Ringed Boghaunter

### Habitat Description

The Ringed Boghaunter is found primarily in acidic sedge fens and sphagnum bogs, with soupy sphagnum pools or troughs, surrounded by woodlands. However, the specific habitat requirements of the Ringed Boghaunter are not well understood, as it seems to be absent from many apparently appropriate sites. The females oviposit and the larvae develop in shallow pools, 6 to 12 inches (15 to 30 cm) in depth, among sphagnum pools or sedge tussocks. These bog mats are suitable as habitat only if they possess open pools and are not choked with heaths. An important requirement for suitable habitat is the presence of surrounding woodlands, which are used as resting places and often as mating sites. All known breeding sites have at least some sphagnum (*Sphagnum* spp.). Other plants often associated with Ringed Boghaunter habitats include three-way sedge (*Dulichium arundinaceum*), highbush blueberry (*Vaccinium corymbosum*), sheep laurel (*Kalmia angustifolia*), leatherleaf (*Chamaedaphne calyculata*), and Atlantic white cedar (*Chamaecyparis thyoides*). Many sites inhabited by Ringed Boghaunters are quite small (< 1 hectare).

**Threats**

The primary threat to the Ringed Boghaunter is habitat destruction through physical alteration or pollution. Much of its former habitat has been destroyed by urbanization; several historically documented populations in Massachusetts now appear to be extirpated. Artificial changes in water level and various forms of pollution, such as agricultural and road runoff, septic system failure, and insecticides, are all potential dangers. The effects of pesticides on dragonflies are not well known, but spraying may be a significant threat to the Ringed Boghaunter. It is important to protect surrounding uplands, as they provide roosting, hunting, and breeding habitat.

**Reference**

Massachusetts Natural Heritage & Endangered Species Program. 2003. Ringed Boghaunter Dragonfly (*Williamsonia lintneri*) Fact Sheet.

## Tule Bluet (*Enallagma carunculatum*, State Special Concern)

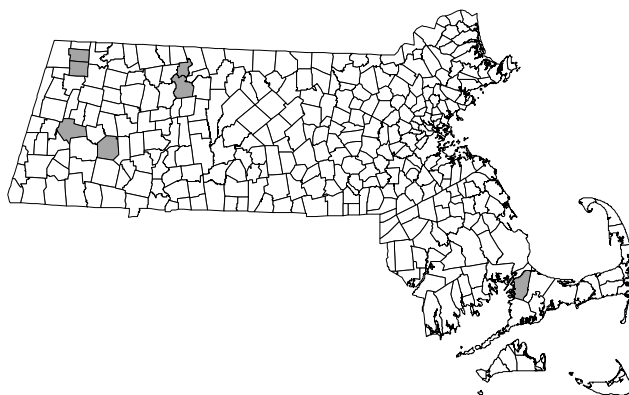
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2	Lakes & Ponds	State List

### Species Description

The Tule Bluet is a small, semi-aquatic insect of the order Odonata, suborder Zygoptera (the damselflies) and family Coenagrionidae (pond damselflies). Like most adult damselflies, the Tule Bluet has a very long, slender abdomen, large eyes on the sides of the head, short antennae, and four heavily veined wings that are held folded together over the back. On males, the thorax is blue with black stripes on the “shoulders” and top. The abdomen, which is composed of ten segments, is blue with varying black markings on each segment, the black most extensive on the 5<sup>th</sup> through 8<sup>th</sup> segments. Females have thicker abdomens than the males, and are generally brown where the males are blue, though older females may become quite bluish. The black abdominal markings are more extensive on females than males. Adult Tule Bluets range from 1 to 1.4 inches (26 mm to 37 mm) in length. Fully developed nymphs are about 0.75 to 0.9 inch (19 mm to 23 mm) in length.

### Distribution and Abundance

There have been nine occurrences of Tule Bluet documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Tule Bluet

### Habitat Description

Tule Bluets inhabit a variety of wetlands, but seem to be most numerous on large lakes. In addition to lentic freshwater habitats, they have also been found on sluggish rivers and apparently are fairly tolerant of brackish and saline conditions. They occur in well-vegetated wetlands as well as at sites where emergent vegetation is sparse. The nymphs are aquatic and live among aquatic vegetation and debris. The adults inhabit emergent vegetation along the shore and nearby uplands.

### Threats

Threats to Tule Bluet populations in Massachusetts are similar to those facing other odonates and, indeed, most wetland fauna. These threats include disturbance from human recreational activities, destruction of habitat for residential and other uses, contamination from herbicides, insecticides, and highway run-off, and alteration of water levels through water pumping or other activities. Management should focus on maintaining water quality, protecting wetlands and adjoining upland buffers (crucial to maturing adults), controlling road run-off, limiting the application of herbicides and insecticides, and maintaining sufficient water levels. Fortunately, Tule Bluets appear to be habitat generalists and their populations locally seem to be at least stable, if not increasing.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Tule Bluet Damselfly (*Enallagma carunculatum*) Fact Sheet.

## Attenuated Bluet (*Enallagma daeckii*, State Special Concern)

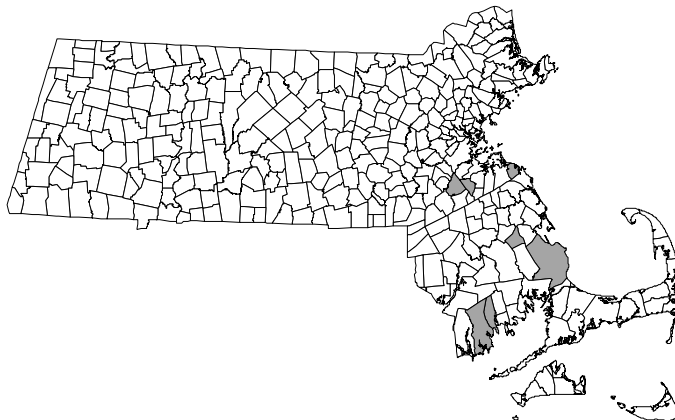
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S2	Lakes & Ponds	State List

### Species Description

The Attenuated Bluet is a small, semi-aquatic insect of the order Odonata, suborder Zygoptera (the damselflies), and family Coenagrionidae (pond damselflies). Like most damselflies, Attenuated Bluets have large eyes on the sides of the head, short antennae, and four heavily veined wings that are held folded together over the back. The Attenuated Bluet is characterized by having an exceptionally long, slender abdomen. On average, it is the longest pond damselfly in the United States. The male's thorax is mostly pale blue with thin black stripes on the "shoulders" and top. The abdomen, which is composed of ten segments, is mostly dark brown/black with some blue on the sides of the base of the abdomen and an entirely blue tip (half of segment 7 and all of segments 8-10). Females have thicker abdomens than the males, and are generally brown where the males are blue, though older females may become quite bluish. Attenuated Bluets range from 1.5 to 1.8 inches (38 mm to 46 mm) in length.

### Distribution and Abundance

There have been seven occurrences of Attenuated Bluet documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Attenuated Bluet

### Habitat Description

Attenuated Bluets inhabit a variety of wetlands, but seem to be most numerous on highly vegetated lakes and ponds. They have also been found in swamps, shady ponds and vegetated stream backwaters. The nymphs are aquatic and live among aquatic and emergent vegetation and debris.

### Threats

Threats to Attenuated Bluet populations in Massachusetts are similar to those facing other odonates and, indeed, most wetland fauna. These threats include disturbance from human recreational activities, destruction of habitat for residential and other uses, contamination from herbicides, insecticides, and highway run-off, and alteration of water levels through water pumping or other activities. Management should focus on maintaining water quality, protecting wetlands and adjoining upland buffers (crucial to maturing adults), controlling road run-off, limiting the application of herbicides and insecticides, and maintaining sufficient water levels.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Attenuated Bluet Damselfly (*Enallagma daeckii*) Fact Sheet.

## New England Bluet (*Enallagma laterale*, State Special Concern)

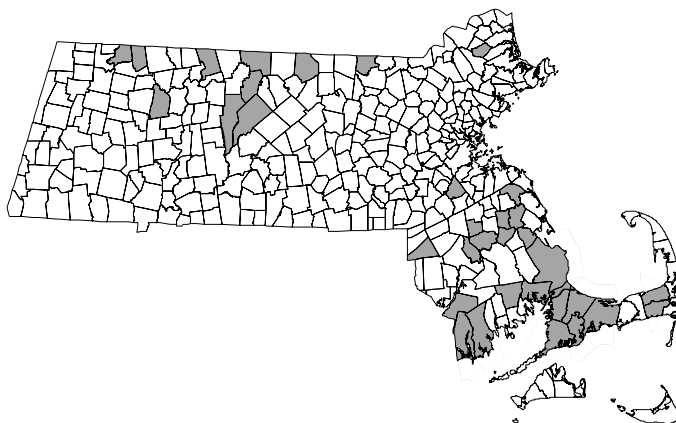
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S3	Lakes & Ponds, Coastal Plain Ponds, Marshes & Wet Meadows	State List; Globally Rare

### Species Description

The New England Bluet is a small, semi-aquatic insect of the order Odonata, suborder Zygoptera (the damselflies), and family Coenagrionidae (pond damsels). Like most damselflies, New England Bluets have large eyes on the sides of the head, short antennae, and four heavily veined wings that are held folded together over the back. The male's thorax is mostly blue with black stripes on the "shoulders" and top. The New England Bluet has a long, slender abdomen composed of ten segments. The abdominal segments are blue with black markings on segments 1 through 7. Segments 6 and 7 are almost entirely black on top. Segments 8 and 9 are entirely blue, except segment 8 has a horizontal black dash on each side of the segment. This mark is always present but varies greatly in size. The top of segment 10 is black. Females have thicker abdomens than the males, and are generally brown where the males are blue, though older females may become quite bluish. New England Bluets average just over one inch (25 mm to 28 mm) in length.

### Distribution and Abundance

There have been 66 occurrences of New England Bluet documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of New England Bluet

### Habitat Description

New England Bluets have been found in a variety of lentic habitats, including swampy open water in north-central Massachusetts, though they are most common at Coastal Plain Ponds. The nymphs are aquatic and live among aquatic vegetation and debris. The adults inhabit emergent vegetation in wetlands and also fields and forest nearby.

### Threats

The major threat to the New England Bluet is most likely the destruction of its breeding habitat. Threats to their habitat include construction and development, artificial drawdown by pumping stations, and run-off from roadways and sewage. In addition, high-impact recreational use, such as off-road vehicles driving through pond shores, which may destroy breeding and nymphal habitat, and motor boats, whose wakes swamp delicate emerging adults, are threats. Because New England Bluets, like many species of damselflies, spend a period of several days or more away from the water maturing, it is important to maintain natural upland habitats near the ponds.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. New England Bluet Damselfly (*Enallagma laterale*) Fact Sheet.



## Scarlet Bluet (*Enallagma pictum*, State Threatened)

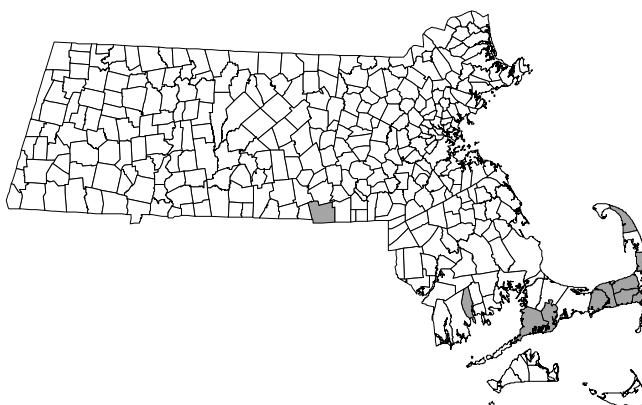
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S3	Coastal Plain Ponds, Lakes & Ponds	State List; Globally Rare

### Species Description

The Scarlet Bluet is a small, semi-aquatic insect of the order Odonata, suborder Zygoptera (the damselflies), and family Coenagrionidae (pond damsels). Like most damselflies, Scarlet Bluets have large eyes on the sides of the head, short antennae, and four heavily veined wings that are held folded together over the back. The eyes are red with a small red spot behind each eye on the back of the head, which is black. The spots are connected by a thin red bar. The Scarlet Bluet has a long, slender abdomen, composed of ten segments. The abdominal segments are orange below and black above. The male's thorax is red with black stripes on the "shoulders" and top. Females are similar in appearance, but have a duller yellow thorax and thicker abdomens than the males. Scarlet Bluets average just over one inch (26 mm to 29 mm) in length.

### Distribution and Abundance

There have been ten occurrences of Scarlet Bluet documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Scarlet Bluet

### Habitat Description

Scarlet Bluets are found in acidic, sandy ponds (including Coastal Plain Ponds) with floating vegetation, often with water lilies (*Nuphar* and *Nymphaea* spp.). Nymphs are aquatic and live among the aquatic vegetation. Adults spend much of their time flying over the water, alighting on lily pads. Before they are sexually mature, the adults inhabit nearby uplands.

### Threats

The major threat to the Scarlet Bluet is degradation and destruction of the wetlands which are its breeding and nymphal habitat. Threats include construction and development, artificial drawdown of pond water-level by groundwater pumping, and run-off from roadways and sewage. In addition, high-impact recreational use such as off road vehicles driving through pond shores, which may destroy breeding and nymphal habitat, and motor boats, whose wakes swamp delicate emerging adults, are threats. Since Scarlet Bluets, like many species of damselflies, spend a period of several days or more away from the pond maturing, it is important to maintain natural upland habitats adjoining the breeding sites for roosting and hunting. Without protected uplands the delicate newly emerged adults are more susceptible to predation and mortality from inclement weather.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 2003. Scarlet Bluet Damselfly (*Enallagma pictum*) Fact Sheet.

## Pine Barrens Bluet (*Enallagma recurvatum*, State Threatened)

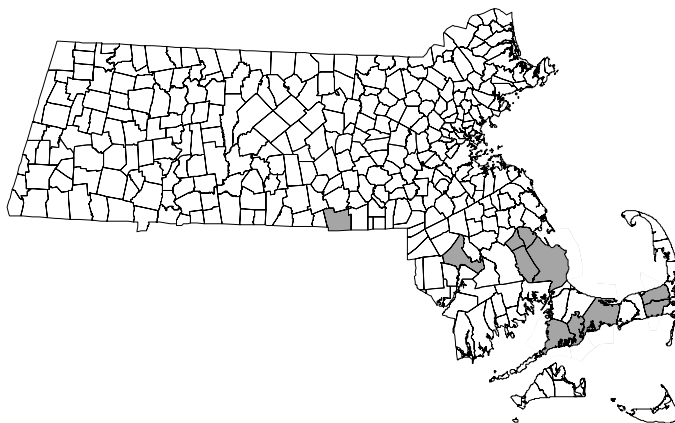
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S3	Coastal Plain Ponds, Lakes & Ponds	State List; Globally Rare

### Species Description

The Pine Barrens Bluet is a small, semi-aquatic insect of the order Odonata, suborder Zygoptera (the damselflies), and family Coenagrionidae (pond damselflies). Like most damselflies, Pine Barrens Bluets have large eyes on the sides of the head, short antennae, and four heavily veined wings that are held folded together over the back. The male's thorax is mostly blue with black stripes on the "shoulders" and top. The Pine Barrens Bluet has a long, slender abdomen, which is composed of ten segments. The abdominal segments are blue with an increasing amount of black distally through segment 7. Segments 8 and 9 are entirely blue, except segment 8 has a small horizontal black dash on each side of the segment. This mark can sometimes be absent. The top of segment 10 is black. Females have thicker abdomens than the males, and are generally brown where the males are blue, though older females may become quite bluish. Pine Barrens Bluets average just over one inch (26mm to 29mm) in length.

### Distribution and Abundance

There have been 53 occurrences of Pine Barrens Bluet documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Pine Barrens Bluet

### Habitat Description

Pine Barrens Bluets are regional endemics and appear to be restricted to Coastal Plain Ponds. Their range coincides closely with the distribution of those ponds. Some of the common attributes shared by ponds inhabited by the Pine Barrens Bluet include: sandy shallow shores; large amounts of vegetation close to the shore, especially Military Rush (*Juncus militaris*); and yearly natural fluctuations in water levels. The nymphs are aquatic and live among aquatic vegetation and debris. The adults inhabit nearby uplands and emergent vegetation along the shore.

### Threats

The major threat to the Pine Barrens Bluet is degradation and destruction of the wetlands which are its breeding and nymphal habitat. Threats include construction and development, artificial drawdown of pond water-level by groundwater pumping, and run-off from roadways and sewage. In addition, high-impact recreational use such as off road vehicles driving through pond shores, which may destroy breeding and nymphal habitat, and motor boats, whose wakes swamp delicate emerging adults, are threats. Since Pine Barrens Bluets, like many species of damselflies, spend a period of several days or more away from the pond maturing, it is important to maintain natural

upland habitats adjoining the breeding sites for roosting and hunting. Without protected uplands the delicate newly emerged adults are more susceptible to predation and mortality from inclement weather.

**Reference**

Massachusetts Natural Heritage & Endangered Species Program. 2003. Pine Barrens Bluet Damselfly (*Enallagma recurvatum*) Fact Sheet.

## Little Bluet (*Enallagma minusculum*, no state status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	SNR	Lakes & Ponds	Globally Rare

### Species Description

The adult Little Bluet is a small blue damselfly about an inch in length, with an equally blue and black abdomen and characteristic deep lavender shoulder stripes. The aquatic larvae are small and tan and typical of the *Enallagma*.

### Distribution and Abundance

The Little Bluet is known from the northeastern United States and southeastern Canada. It is uncommon in central and eastern Massachusetts, but more common in the southeast coastal plain. It is most common on Cape Cod, and is known from 11 towns in Massachusetts: Ashburnham, Barnstable, Brewster, Chatham, Dennis, Mashpee, Plymouth, Sandwich, Truro, Wellfleet, and Yarmouth (Blair Nikula, personal communication).

### Habitat Description

The Little Bluet inhabits ponds with sparse emergent or aquatic vegetation and a sandy substrate. Adults also roost and hunt in the surrounding uplands (Nikula et al. 2003).

### Threats

The major threat to this species is the loss of wetland habitat. Draining, water table drawdown, clearing to pond edges, and other forms of anthropogenic habitat alteration are threats to this species.

### Reference

Nikula, B., Loose, J. L. and M. R. Burne. 2003. A Field Guide to the Dragonflies and Damselflies of Massachusetts. Massachusetts Natural Heritage & Endangered Species Program, Westborough, Massachusetts.

## **K. Beetles**

## Twelve-spotted Tiger Beetle (*Cicindela duodecimguttata*, State Special Concern)

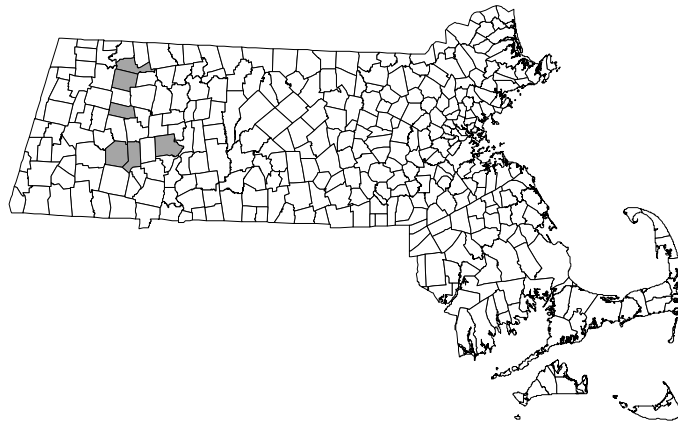
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Large & Mid-sized Rivers	State List

### Species Description

Adult *C. duodecimguttata* are dark brown to nearly black beetles 12 to 15 mm in length. They have elytral maculations similar to the more abundant *C. repanda*, though the maculations are usually broken in Massachusetts specimens. Their coloration is often cryptic, making these animals difficult to discern against the background of their dark habitats.

### Distribution and Abundance

There have been seven occurrences of the Twelve-spotted Tiger Beetle documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). Due to its similarity with *C. repanda* and the likelihood of finding both species in similar habitats, *C. duodecimguttata* is probably overlooked. Adults are active in the spring and fall.



Massachusetts Towns with Recent Occurrences of Twelve-spotted Tiger Beetle

### Habitat Description

Damp habitats consisting of dark silty deposits along rivers and ponds are the primary habitats for adults. Larvae are often found associated with dark clay and silt banks along wooded riversides and ponds. Adults disperse widely and may be found far removed from their larval habitats along wet logging roads and woodland paths.

### Threats

Bank stabilization, impoundment (flooding of habitat), and disturbance to natural flow regimes are all threats to this species.

### Reference

Leonard, J.G., and R.T. Bell 1999. *Northeastern Tiger Beetles: A Field Guide to Tiger Beetles of New England and Eastern Canada*. CRC Press, New York.

## Hentz's Redbelly Tiger Beetle (*Cicindela rufiventris hentzii*, State Threatened)

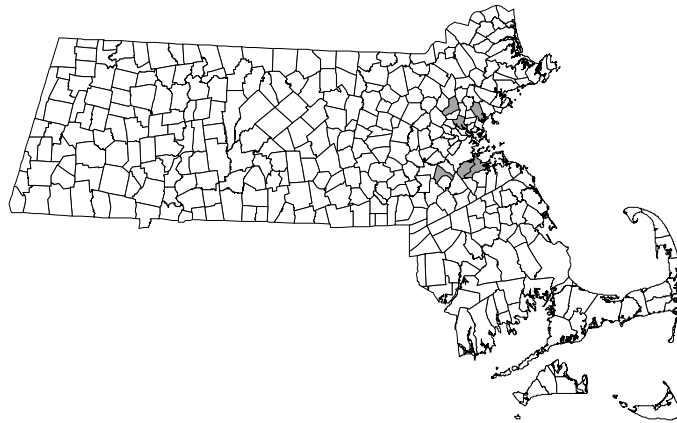
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5T2T3	S2S3	Rock Cliffs/ Ridgetops/Talus Slopes	State List; Globally Rare

### Species Description

*Cicindela rufiventris hentzii* is a subspecies known only from Massachusetts and one site in Rhode Island. The abdomen, particularly visible when the animal is in flight, is usually bright red. The 9- to 12-mm-long adults are dark in coloration with highly variable maculations.

### Distribution and Abundance

There have been six occurrences of Hentz's Redbelly Tiger Beetle documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). *C. r. hentzii* is currently known from several open bedrock outcrops north, east, and west of Boston.



Massachusetts Towns with Recent Occurrences of Hentz's Redbelly Tiger Beetle

### Habitat Description

Sunny rock outcrops with sparse vegetation and abundant soil-filled fissures provide typical habitats for *C. r. hentzii*. Some of the ridgelines used by *C. r. hentzii* burn frequently, which may enhance habitat for both larvae and adults by clearing vegetation and opening the canopy.

### Threats

Industrial and residential development are threats to this beetle.

### Reference

Leonard, J.G., and R.T. Bell 1999. *Northeastern Tiger Beetles: A Field Guide to Tiger Beetles of New England and Eastern Canada*. CRC Press, New York.

## Northeastern Beach Tiger Beetle (*Cicindela dorsalis dorsalis*, State Endangered, Federal Threatened)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4T2	S1	Coastal Dunes/ Beaches/ Small Islands	Federal List; State List; Globally Rare

### Species Description

The Northeastern Beach Tiger Beetle is an active coastal predator, approximately 13.0 to 15.5 mm (0.5 to 0.6 inches) in length, with a bronze green head and thorax, long slender legs, and white or tan elytra (wing covers), which are often finely imprinted with dark lines. Tiger beetles are so named because of their "tiger-like" behavior of chasing down prey and capturing the victims with their long mandibles. The larva of the Northeastern Beach Tiger Beetle is pale in color, with one pair of antennae on the head, an iridescent black and green pronotum (analogous to a "neck") covered with setae (hairs), and a long segmented abdomen.

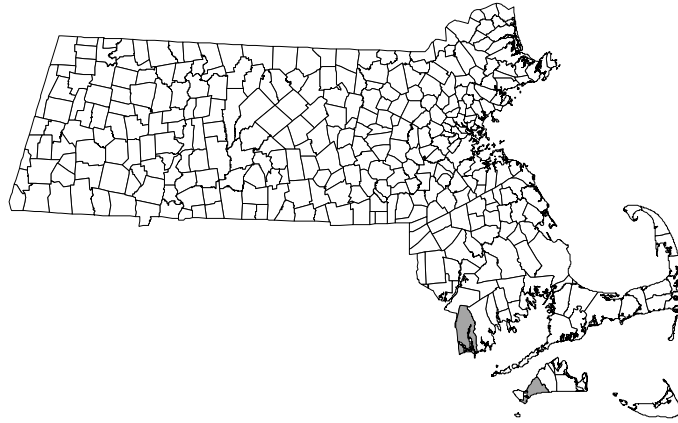
Emergence of adult Northeastern Beach Tiger Beetles in Massachusetts occurs from early June to mid-August, peaking in mid-July. The adults forage in the intertidal zone where they prey on invertebrates for much of their food and scavenge on dead fish. The primary food of larvae is "sand fleas" (amphipods), which can be very numerous and occur in wet sand and under the sea-wrack. They are primarily diurnal, but they are also quite active at night from mid-July to late August. Mating occurs from late July to early August, after which the female Northeastern Beach Tiger Beetles oviposits in the intertidal zone. By September, most, if not all, of the adult beetles have died.

Northeastern Beach Tiger Beetles have a two-year life cycle. Older larvae (2nd and 3rd "instars" or larval stages), which have overwintered, first appear in late May and June, while 1<sup>st</sup>-instar larvae appear in mid-August. The larvae dig vertical burrows in the sand. The position of the burrows changes over the course of the year; in late spring, the burrows of larvae that have overwintered are located well up the beach near or beyond the edge of vegetation. In midsummer, the burrows of young, recently hatched larvae are within a few meters of the high-tide line; by autumn, the burrows are once again at the upper end of the beach. The changes in larval burrow location parallel the erosion-accretion cycle of the beach: the beach widens in the summer as sand is deposited, and narrows in the fall and winter as stronger winds and waves transport the sand offshore.

### Distribution and Abundance

There have been two occurrences of Northeastern Beach Tiger Beetle documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). An ongoing effort to restore a population at a National Wildlife Refuge appears to be successful. The Northeastern Beach Tiger Beetle is very restricted in its range. Historically, it could be found along the Atlantic coastline from Massachusetts to Virginia. Today, it is found only at the extremes of its former range, in the Chesapeake Bay area in Maryland and Virginia, and two beaches in southeastern Massachusetts. The Martha's Vineyard population has spread eastward into formerly occupied sites due to a reduction in off-road vehicle use and the creation of habitat by coastal storm events.





**Massachusetts Towns with Recent Occurrences of Northeastern Beach Tiger Beetle**

### **Habitat Description**

In general, the Northeastern Beach Tiger Beetle requires large, highly exposed beaches with fine sand particles and a low amount of human disturbance. The largest population of Northeastern Beach Tiger Beetles in Massachusetts inhabits an exposed offshore barrier beach, ranging in width from 15.5 to 34 meters (50 to 110 feet), with a mixture of high, well-defined dunes and low, unstable dunes at the upper end of the beach. The predominant form of vegetation on the dunes and upper beach is beach grass (*Ammophila breviligulata*). The beach is relatively pristine and undisturbed by human activities. Concentrations of adults and larvae have been correlated with dune blow outs and washover fans, both structures resulting from storms.

### **Threats**

The Northeastern Beach Tiger Beetle formerly inhabited several beaches on outer Cape Cod and was abundant on Nantucket and Martha's Vineyard, but it has not been found at any of these beaches (with two exceptions) for many years. Increased human recreational pressure on these beaches, particularly off-road vehicle traffic, is largely responsible for the disappearance of these populations, as well as many others along the Atlantic Coast. Off-road vehicles can kill adults and larvae directly by crushing them. Off-road vehicles also can continually damage the larval burrows; as a result, the larvae must reduce their feeding time and expend a considerable amount of energy to repair the burrows. Beach stabilization structures interrupt natural processes of erosion and deposition and have been responsible for eliminating several formerly occupied sites.

The proximity of the larval burrows to the high-tide line in mid-summer increases their chance of being washed away; a severe storm or early season hurricane at this time could potentially wipe out the entire state population.

Oil spills can also negatively impact both larvae and adult Northeastern Beach Tiger Beetles.

### **Reference**

Massachusetts Natural Heritage & Endangered Species Program. 1991. Northeastern Beach Tiger Beetle (*Cicindela dorsalis dorsalis*) Fact Sheet.

## Bank Tiger Beetle (*Cicindela limbalis*, State Special Concern)

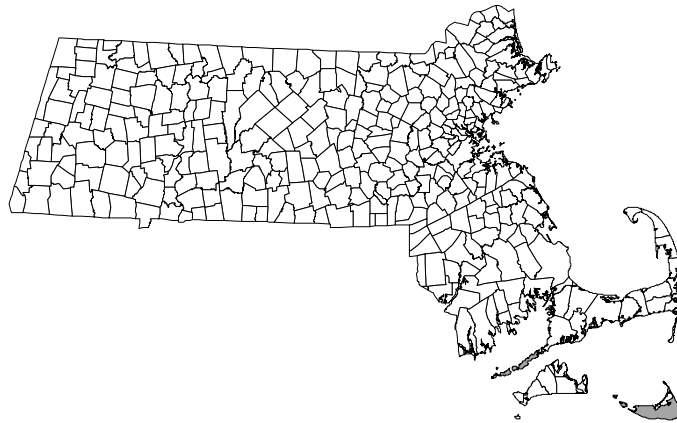
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Coastal Dunes/ Beaches/ Small Islands	State List

### Species Description

Sometimes greenish blue but usually a royal purple bronze with conspicuous maculations, *C. limbalis* is 14 to 16mm long and very similar in appearance to its close congener, *C. purpurea*. Spring and fall are the primary flight seasons for *C. limbalis*.

### Distribution and Abundance

There have been two occurrences of Bank Tiger Beetle documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). Small numbers of adults (<6) on any given day are often the most one can expect to observe at a single site.



Massachusetts Towns with Recent Occurrences of Bank Tiger Beetle

### Habitat Description

In Massachusetts, *C. limbalis* is known only from the coastal, morainal sand cliffs of the off-shore islands. Larvae use the base and benches of the cliffs for their burrows and adults are usually found on the beaches at the bases of the cliffs.

### Threats

Bank stabilization is the most prominent threat to the species in Massachusetts. Off-road vehicles driving the beach at the base of the cliffs will kill many adults.

### Reference

Leonard, J.G., and R.T. Bell 1999. *Northeastern Tiger Beetles: A Field Guide to Tiger Beetles of New England and Eastern Canada*. CRC Press, New York.

## Cobblestone Tiger Beetle (*Cicindela marginipennis*, State Endangered)

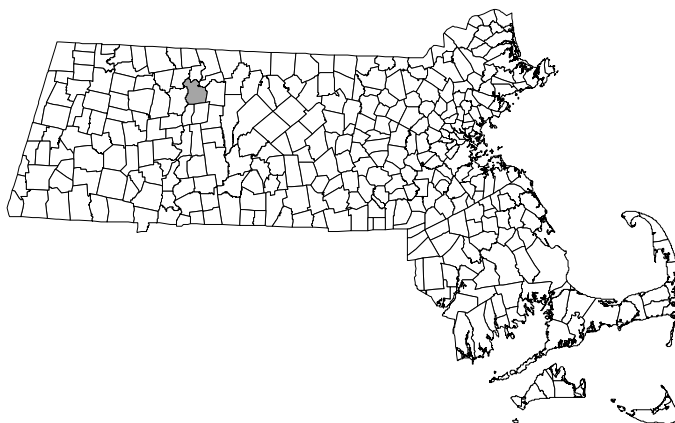
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G2G3	SNR	Connecticut & Merrimack Mainstems	State List; Globally Rare

### Species Description

Very distinctly marked with a prominent white margin on the elytra, *C. marginipennis* was discovered only very recently in Massachusetts. Olive green and 12 to 14 mm in length, this species flies in midsummer with peak census numbers in mid-July.

### Distribution and Abundance

There has been one occurrence of Cobblestone Tiger Beetle documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). Population estimates based on visual surveys are highly variable from year to year, but drastic fluctuations are probably normal for animals inhabiting such dynamic habitats.



Massachusetts Towns with Recent Occurrences of Cobblestone Tiger Beetle

### Habitat Description

*C. marginipennis* is confined to a high-energy riverine beach dominated by medium- to small-sized cobbles and sparse vegetation. Larvae burrow in sandy interstitial areas and adults fly from cobble to cobble and use the sand beach margins to forage for small invertebrates.

### Threats

River impoundments lower current velocity and flood potential habitat for Cobblestone Tiger Beetles. Unnaturally high volumes and durations of water releases, particularly during the summer flight season, may reduce adult populations significantly and prevent females from ovipositing a full complement of eggs. Disturbance of natural flow regimes or altering equilibrated flow regimes are likely to have negative impacts on the species.

### Reference

Leonard, J.G., and R.T. Bell 1999. *Northeastern Tiger Beetles: A Field Guide to Tiger Beetles of New England and Eastern Canada*. CRC Press, New York.

## Barrens Tiger Beetle (*Cicindela patruela*, State Endangered)

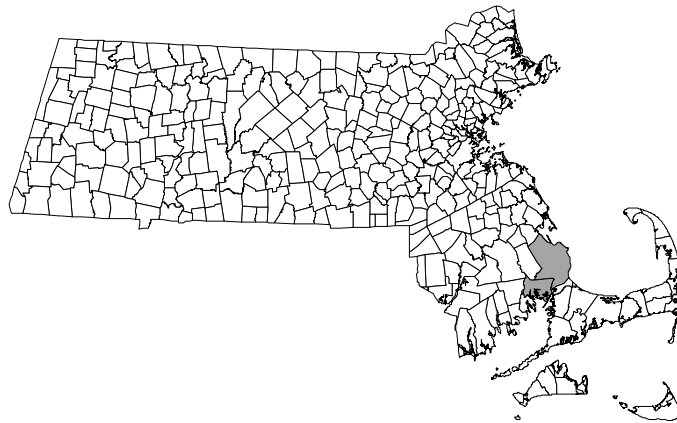
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S1	Pitch Pine/Scrub Oak	State List; Globally Rare

### Species Description

Slightly less metallic in coloration than *C. sexguttata*, *C. patruela* is much rarer in Massachusetts. This spring-and-fall active species is 12 to 15mm long and can be observed from mid-April through mid-June and again from mid-August through September.

### Distribution and Abundance

There have been two occurrences of *C. patruela* documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). Currently confined to the area of Myles Standish State Forest, adults emerge over a period of several weeks and only a few individuals are observed on any single day.



Massachusetts Towns with Recent Occurrences of Barrens Tiger Beetle

### Habitat Description

In Massachusetts, *C. patruela* occurs exclusively in sparsely vegetated openings in pine barrens. It appears to have an affinity for open sand areas resulting from severe fires and for scarified areas with limited or no vehicular traffic.

### Threats

Off-road vehicles create conditions that attract dispersing adults, but also cause direct mortality as individuals do not evade approaching vehicles.

### Reference

Leonard, J.G., and R.T. Bell 1999. *Northeastern Tiger Beetles: A Field Guide to Tiger Beetles of New England and Eastern Canada*. CRC Press, New York.

## Puritan Tiger Beetle (*Cicindela puritana*, State Endangered, Federal Threatened)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G1G2	S1	Connecticut & Merrimack Mainstems	Federal List; State List; Globally Rare

### Species Description

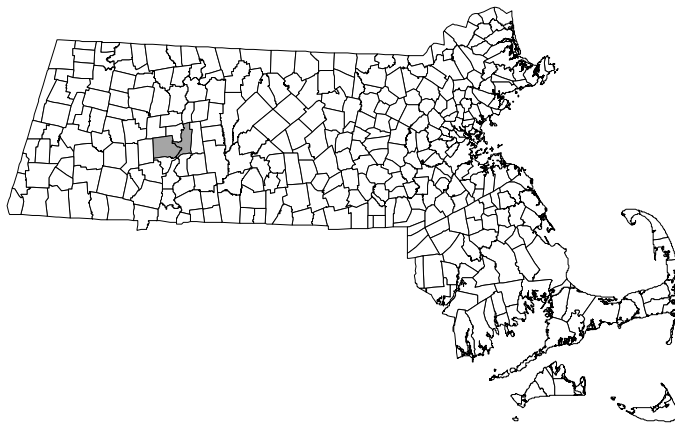
The Puritan Tiger Beetle is a diurnal insect, approximately 12 to 18 mm (0.5 to 0.7 in.) in length, with long, slender legs, a metallic blue underside, and a brownish-bronze dorsal surface. Each of its wing covers is marked with thin transverse and marginal maculations.

Larvae of the Puritan Tiger Beetle are black and shiny, with one pair of antennae on the head, a pronotum covered with setae, and a long segmented abdomen. They range in size from 7.7 mm (0.3 in.) at the first instar to 14.3 mm (0.55 in.) at the third instar. Besides this change in size, they do not change drastically in appearance between molts.

Female Puritan Tiger Beetles oviposit in mid to late August. The eggs hatch in late August or early September; the newly emerged larvae inhabit burrows in the soil, where they capture small insects that wander by the burrow entrances. The larvae molt to the 2nd instar in October and overwinter until the following year. They feed through the summer before finally molting to the third instar at summer's end. The larvae overwinter again, and transform into pupae in late May or early June. Finally, in late June to early July, the Puritan Tiger Beetles emerge from their burrows as adults. They are most active on hot, sunny days, and prey on flies, ants, and other small insects. Mating and oviposition occur until mid to late August, after which they die.

### Distribution and Abundance

There have been three occurrences of Puritan Tiger Beetle documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). The Puritan Tiger Beetle is very restricted in range. Historically, it only inhabited scattered localities along the Connecticut River in New Hampshire, Massachusetts, and Connecticut, as well as the Chesapeake Bay area of Maryland. It is now found in a handful of locations along the Connecticut River in Massachusetts and Connecticut, a 26-mile stretch of the Chesapeake Bay area, and one other site in Kent County, Maryland.



Massachusetts Towns with Recent Occurrences of Puritan Tiger Beetle

### Habitat Description

The few remaining populations of Puritan Tiger Beetles in Massachusetts all inhabit sand beaches and silt terraces along the Connecticut River. These beaches have sparse vegetation and are often located at the bends of the river.

Puritan Tiger Beetle larvae live in burrows at the upper margin of the beaches and in the silt terraces a few feet above the river.

### **Threats**

Recreational use, vehicular traffic, and camping cause habitat degradation and trampling of larval burrows. The first instar larvae are most harmed by these activities, as their burrows are not very deep. Riverbank stabilization projects and development along the Connecticut River have significantly reduced the amount of suitable habitat for the Puritan Tiger Beetle in Massachusetts. Impoundments have flooded several sites historically occupied by *C. puritana*.

### **Reference**

Massachusetts Natural Heritage & Endangered Species Program. 1990. Puritan Tiger Beetle (*Cicindela puritana*) Fact Sheet.

## Purple Tiger Beetle (*Cicindela purpurea*, State Special Concern)

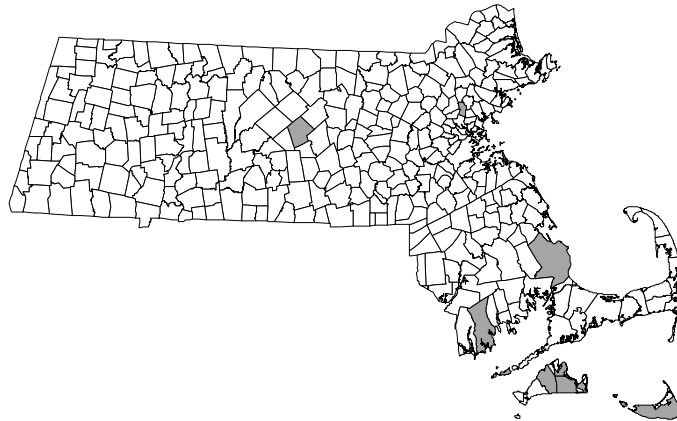
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2S3	Grasslands	State List

### Species Description

Closely related to *C. limbalis*, *C. purpurea* is also very similar in appearance, differing only slightly in maculation. It has distinct habitat preferences. Most often a vivid shining purple, *C. purpurea* is also seen in a greenish form. *C. purpurea* is active early spring and again in late summer to early fall, with a two-year life cycle.

### Distribution and Abundance

There have been 17 occurrences of the Purple Tiger Beetle documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). There have been more than 50 historical occurrences of *C. purpurea* in Massachusetts, and the rapid decline in the last half of the 20<sup>th</sup> century probably reflects the species affinity for agriculturally derived habitats. More than 10 individuals at a locality are very rarely observed.



Massachusetts Towns with Recent Occurrences of Purple Tiger Beetle

### Habitat Description

*C. purpurea* is most frequently associated with semi-compact, sandy loam soils along farm roads, grass strip runways, or open roads on earthen dams. It is currently most frequently seen in the grasslands and heathlands of southeastern Massachusetts, especially Martha's Vineyard and Nantucket. Larvae occur in sparsely vegetated areas with grass or heath composition.

### Threats

Succession to shrubland or forest, paving of grassy roads and grass strip airports, and excessive vehicular use are all threats to this species.

### Reference

Leonard, J.G., and R.T. Bell 1999. *Northeastern Tiger Beetles: A Field Guide to Tiger Beetles of New England and Eastern Canada*. CRC Press, New York.

## American Burying Beetle (*Nicrophorus americanus*, State Endangered, Federal Endangered)

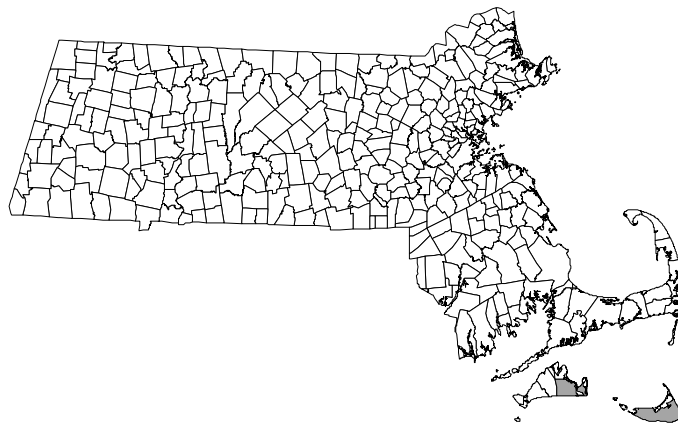
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G2G3	S1	Grasslands, Pitch Pine/Scrub Oak	Federal List; State List; Globally Rare

### Species Description

The American Burying Beetle is a member of the family Silphidae, the carrion or sexton beetles. It is the largest member of its genus in North America, measuring 25 to 36 mm (1.0-1.4 inches). The beetle has a large orange-red pronotal disk, an orange antennal club, a red frons, and two pairs of scalloped red spots on the black elytra. Male and female American Burying Beetles are indistinguishable externally.

### Distribution and Abundance

The American Burying Beetle was formerly extirpated from Massachusetts. There have been two occurrences of the species documented in Massachusetts since 1980, both resulting from restoration efforts (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of American Burying Beetle

### Habitat Description

Evaluations of habitat associations for American Burying Beetle have been inconclusive, ranging from agricultural lands to old growth. Recent research in Oklahoma and Nebraska suggest an affinity for grasslands, burned woodlands with sparse understory, and savannas. Size of available carrion appears to be important, and optimal-sized carrion are associated with grassland habitats.

### Threats

There is no consensus on the factors that caused the rapid decline of the American Burying Beetle. One theory attributes the decline to a loss of appropriate carrion, another to a loss of habitat, another to the introduction of a parasitoid. Extirpation on such a broad scale suggests a cumulative series of threats caused the decline.

### Reference

Ratcliffe, B.C. 1996. *The Carrion Beetles (Coleoptera: Silphidae) of Nebraska*. Bull. Univ. of Nebraska State Museum, Vol 13.



## Sylvan Hygrotus Diving Beetle (*Hygrotus sylvanus*, no state status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
GH	SNR	Vernal Pools, Peatlands	Globally Rare

### Species Description

The Sylvan Hygrotus Diving Beetle is described as “characterized as red-brown and shiny. Bottom punctures are visible and the protarsi and mesotarsi of the male are only slightly dilated” (Anderson, 1976).

### Distribution and Abundance

The species has only been collected twice since 1890, worldwide.

### Habitat Description

The habitat of this species is not well understood. Pools in fens, vernal pools, and small ponds have all been suggested as possibilities.

### Threats

Threats to this species are unknown.

### References

Anderson, R. D. 1976. A revision of the Nearctic species of *Hygrotus* groups II and III (Coleoptera: Dytiscidae). *Ann. Ent. Soc. Amer.* 69:577-584.

## **L. Butterflies and Moths**

## Coastal Heathland Cutworm (*Abagrotis nefascia*, State Special Concern)

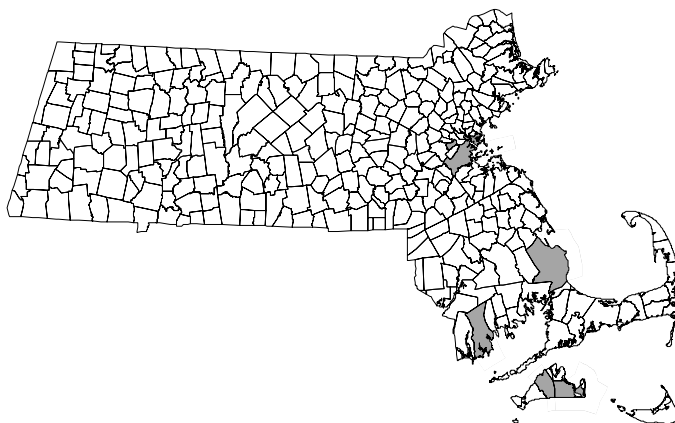
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4T3	S3	Grasslands, Pitch Pine/Scrub Oak	State List; Globally Rare

### Species Description

Coastal Heathland Cutworms are noctuid moths. The forewings are reddish-brown, with bluish-white terminal bands and black costal wedges. The hind wings are grayish-brown, darker towards the terminal area. The wingspan is 30-35 mm. The larva is a smooth-skinned, brownish-gray to brownish-black cutworm, reaching a length of about 30 mm.

### Distribution and Abundance

There have been 32 occurrences of the Coastal Heathland Cutworm documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of the Coastal Heathland Cutworm

### Habitat Description

In eastern North America, the Coastal Heathland Cutworm occurs in xeric and open coastal plain habitats on sandy soil. In Massachusetts, this species is associated with sandplain/dunegrass grasslands, coastal heathlands and other maritime shrublands, and occasionally open pitch pine/scrub oak barrens. All known Massachusetts occurrences are on the coastal plain, between sea level and 150 feet in elevation. In the western U.S., larvae feed on serviceberry (*Amelanchier*) and wild currant (*Ribes aureum*). Massachusetts host plants are undocumented.

### Threats

- Loss and degradation of habitat (sandplain grasslands and dunes, coastal heathlands, and pitch pine/scrub oak barrens) due to development, succession, and invasion by exotic plants. This species' habitat preferences are typically open, fire-dependent habitats, so fire suppression contributes to habitat loss.
- Spraying with insecticides.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. No date. Coastal Heathland Cutworm (*Abagrotis crumbi benjamini*) Fact Sheet.

## Barrens Daggermoth (*Acronicta albarufa*, State Threatened)

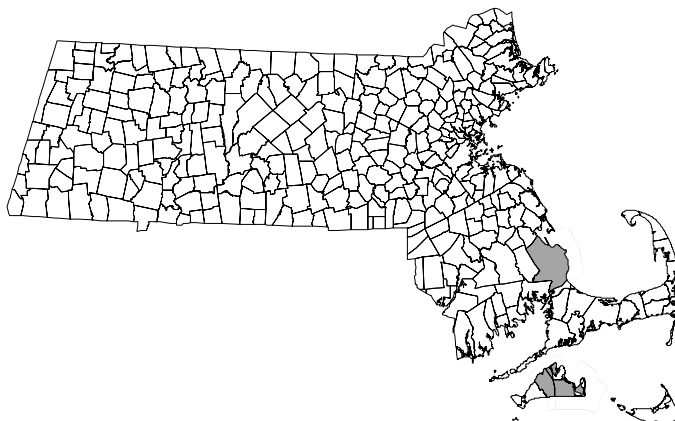
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S2S3	Pitch Pine/Scrub Oak	State List; Globally Rare

### Species Description

The Barrens Daggermoth is a noctuid moth with blue-gray forewings mottled with black and white, a black basal dash curving towards the costa a rusty-brown reniform spot, and a small, round, orbicular spot, often white with a dark center. The hind wings are white in males and grayish-brown in females. The wingspan is 30 to 37 mm.

### Distribution and Abundance

There have been sixteen occurrences of the Barrens Daggermoth documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of the Barrens Daggermoth

### Habitat Description

The Barrens Daggermoth inhabits xeric, oak-dominated woodland, barrens, and scrub habitats on sandy soil. In Massachusetts, associated plant communities include xeric, open pitch pine/scrub oak barrens and, especially, scrub oak thickets. All known Massachusetts records are on the coastal plain between 20 and 200 feet in elevation. Larvae feed on oaks, and scrub oak (*Quercus ilicifolia*) is the larval host in Massachusetts, probably exclusively.

### Threats

- Loss and degradation of habitat, especially pitch pine/scrub oak barrens. This species' habitat preferences are often for fire-dependent habitats, so fire suppression contributes to habitat loss.
- Pesticides (especially Dimlin) targeting mosquitos and gypsy moths are a potentially serious threat; DDT spraying of forests in the 1950s and more recent spraying with other gypsy moth control agents may be responsible for this species' decline in New England.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. No date. Barrens Daggermoth (*Acronicta albarufa*) Fact Sheet.

## Spiny Oakworm (*Anisota stigma*, State Special Concern)

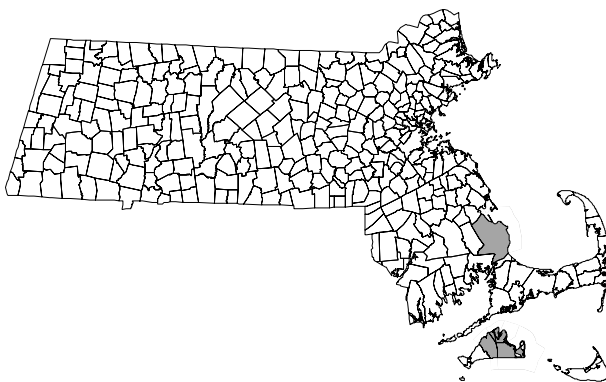
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Pitch Pine/Scrub Oak	State List

### Species Description

Spiny Oakworms are in the giant silk moth family (Saturniidae). Adults are sexually dimorphic, with females larger (wingspan 53-60 mm) than males (45-47 mm). Female wing color is golden-yellow with varying amounts of orange toward costa and along wing margin, and pink shading along postmedial line. Male is smaller, with darker orange to reddish-brown wing color and varying amount of purple shading along postmedial line and toward wing margin. Wings of both sexes are peppered with black; conspicuous white reniform spot on each forewing. Spiny Oakworm larvae are typically a dark shade of rusty orange, brownish-gray to black ventrally and along the lateral line; spiracles enclosed with black spot surrounded by white ellipse. Black dorsal spines are arranged in rows, one long (~7 mm) pair on the thorax and one short (~3 mm) pair on each abdominal segment; spines often branched at tips. Full-grown larvae are 40-60 mm in length.

### Distribution and Abundance

There have been 24 occurrences of Spiny Oakworm documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of the Spiny Oakworm

### Habitat Description

In the Northeast, the Spiny Oakworm is generally restricted to xeric coastal sandplain communities such as scrub oak thickets and open pitch pine/scrub oak barrens; dry, open oak/pine woodlands are also used occasionally, especially on Martha's Vineyard. All Massachusetts occurrences are on the coastal plain between 20 and 200 feet in elevation. Rangewide, Spiny Oakworms feed on various oaks (*Quercus*) and hazels (*Corylus*), and historically also on American chestnut (*Castanea dentata*). Hickory (*Carya*) has been reported as a host, but is probably not normally used. In Massachusetts, this species feeds primarily on scrub oak (*Quercus ilicifolia*) in barrens habitats; other oaks (*Quercus* spp.) are used in the woodlands on Martha's Vineyard.

### Threats

- Loss and degradation of habitat (especially open pitch pine/scrub oak barrens with scrub oak thickets) due to development and succession. This species' habitat preferences are typically open, fire-dependent habitats, so fire suppression contributes to habitat loss.
- Spraying with insecticides.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Spiny Oakworm (*Anisota stigma*) Fact Sheet.

## Drunk Apamea Moth (*Apamea inebriata*, State Special Concern)

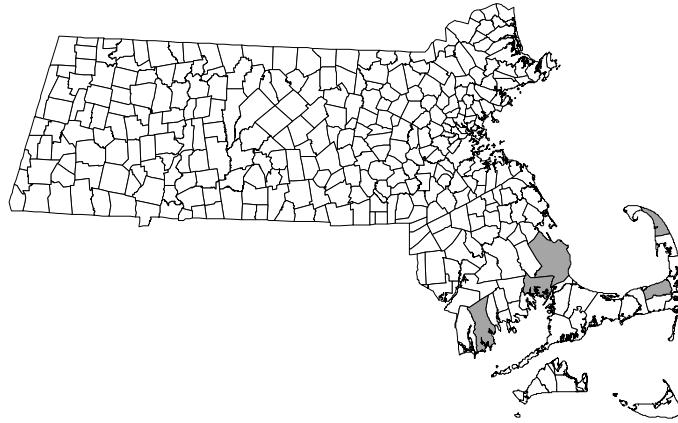
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S2S3	Peatlands, Marshes & Wet Meadows	State List; Globally Rare

### Species Description

The Drunk Apamea Moth is a noctuid moth with yellowish-tan forewings, overlaid with a brown streak extending from base to costal margin, and inner margin shaded whitish-gray. The hindwings are nondescript, brownish-gray. Wingspan is 36-40 mm.

### Distribution and Abundance

There have been seven occurrences of Drunk Apamea Moth documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of the Drunk Apamea Moth

### Habitat Description

The Drunk Apamea Moth is restricted to the coastal plain, where it inhabits acidic freshwater wetlands with emergent vegetation (e.g., peatlands, marshes, coastal plain pond shores). Larval hosts are undocumented. Larvae of other *Apamea* species feed on grasses (Poaceae) and/or sedges (Cyperaceae), consuming seed heads in early instars and exhibiting typical “cutworm” foraging on grasses and sedges in later instars.

### Threats

- Loss and degradation of habitat (freshwater wetlands, such as peatlands, marshes, and coastal plain pond shores).
- Spraying with insecticides.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Drunk Apamea Moth (*Apamea inebriata*) Fact Sheet.

## Coastal Plain Apamea Moth (*Apamea mixta*, State Special Concern)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
GU	S1	Peatlands, Marshes & Wet Meadows	State List

### Species Description

The Coastal Plain Apamea Moth is in the owlet family (Noctuidae). The forewings are dark brown, nearly black, with small, yellowish-white reniform spot. Hindwings are nondescript, brownish-gray. The wingspan is 32-36 mm.

### Distribution and Abundance

All documented occurrences of the Coastal Plain Apamea Moth in Massachusetts are more than 25 years old (NHESP database, accessed December, 2004). There are specimens at the Harvard Museum of Comparative Zoology, collected in Wareham in 1965 and 1975, and additional specimens from Wareham at the American Museum of Natural History, collected in 1966, 1967, and 1973. There are a number of older historical records (e.g., >50 years old) from Martha's Vineyard and Nantucket. This species was apparently observed on Martha's Vineyard in 1991 by P.Z. Goldstein, but no documentation has been submitted to NHESP.

### Habitat Description

The habitat requirements of this species are poorly understood. In Canada, the Coastal Plain Apamea Moth seems to be associated with acidic bogs and swamps within coniferous forest. In the northeastern U.S., this species occurs in acidic freshwater wetlands on the coastal plain, including bogs and marshes. The larval host plants are unknown. Larvae of other *Apamea* species feed on grasses (Poaceae) and/or sedges (Cyperaceae), consuming seed heads in early instars and exhibiting typical "cutworm" foraging on grasses and sedges in later instars.

### Threats

- Loss and degradation of habitat (freshwater wetlands, such as peatlands and marshes).
- Spraying with insecticides.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Coastal Plain Apamea Moth (*Apamea mixta*) Fact Sheet.

## New Jersey Tea Inchworm (*Apodrepanulatrix liberaria*, State Endangered)

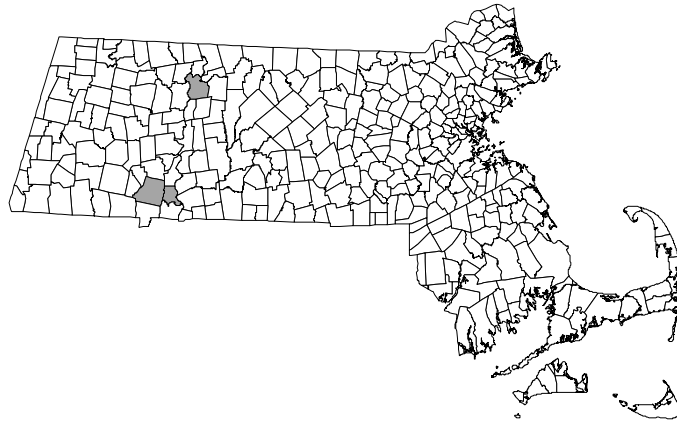
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1S2	Pitch Pine/Scrub Oak	State List

### Species Description

Adult New Jersey Tea Inchworms are geometrid moths with somewhat variable wing color and pattern, ranging from pale yellow to medium brown, sometimes with darker shading in median and terminal areas. Many specimens feature three or four dark lines evenly spaced across forewings and hindwings, with the line closest to terminus most conspicuous and consisting of a series of dots. Forewings have a dark, oblique apical dash. The wingspan is 25-33 mm. The larva is a green inchworm, sometimes becoming brown in later instars, with several pale, yellow longitudinal lines; the spiracular stripe is the most conspicuous. A full-grown larva is 25-30 mm long.

### Distribution and Abundance

There have been three occurrences of the New Jersey Tea Inchworm documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of the New Jersey Tea Inchworm

### Habitat Description

New Jersey Tea Inchworms inhabit xeric, open areas on sandy or rocky soil with abundant New Jersey Tea (*Ceanothus americanus*), the exclusive larval host. In southern New England and New York, habitats include pitch pine/scrub oak barrens and similar sandplain communities, as well as rocky outcrops and ridges. Current Massachusetts occurrences are restricted to sandplains and ridges in the Connecticut River Valley.

### Threats

- Loss and degradation of habitat (especially pitch pine/scrub oak barrens) due to development and succession. Requires open, fire-dependent habitats that sustain large patches of New Jersey Tea, so fire suppression contributes to habitat loss.
- Spraying with insecticides.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. New Jersey Tea Inchworm (*Apodrepanulatrix liberaria*) Fact Sheet.



## Straight Lined Mallow Moth (*Bagisara rectifascia*, State Special Concern)

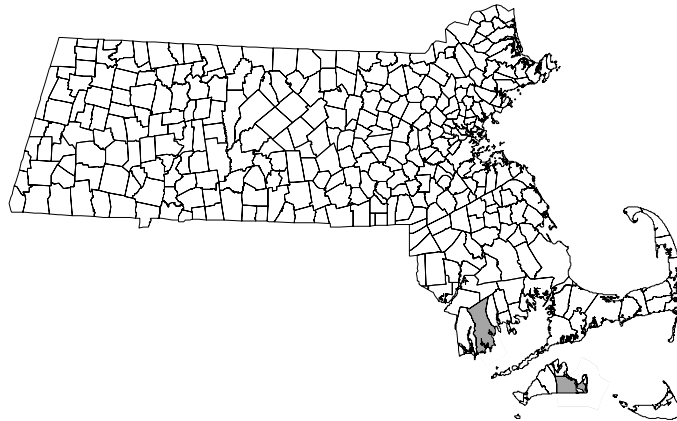
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S2S3	Marshes & Wet Meadows, Salt Marsh, Coastal Dunes/ Beaches/ Small Islands	State List

### Species Description

The Straight Lined Mallow Moth is a relatively small noctuid with brown forewings traversed by three parallel, cream-colored lines extending from costa to basal area; hindwings are white basally, with brown shading increasing toward margin. The wingspan is approximately 25 mm.

### Distribution and Abundance

There have been 15 occurrences of the Straight Lined Mallow Moth documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of the Straight Lined Mallow Moth

### Habitat Description

In Massachusetts, the Straight Lined Mallow Moth is restricted to the coastal plain, where it occurs in coastal strand habitats such as salt and freshwater marshes, maritime scrub, heathlands, and dunes. It also occurs in pitch pine/scrub oak barrens. In coastal habitats the primary larval host is rose mallow (*Hibiscus moscheutos*); the larval host is undocumented in barrens habitat, but may be hazelnut (*Corylus* spp.).

### Threats

- Loss and degradation of habitat, especially coastal marshes.
- Spraying with insecticides.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Straight Lined Mallow Moth (*Bagisara rectifascia*) Fact Sheet.

## Hessel's Hairstreak (*Callophrys hesseli*, State Special Concern)

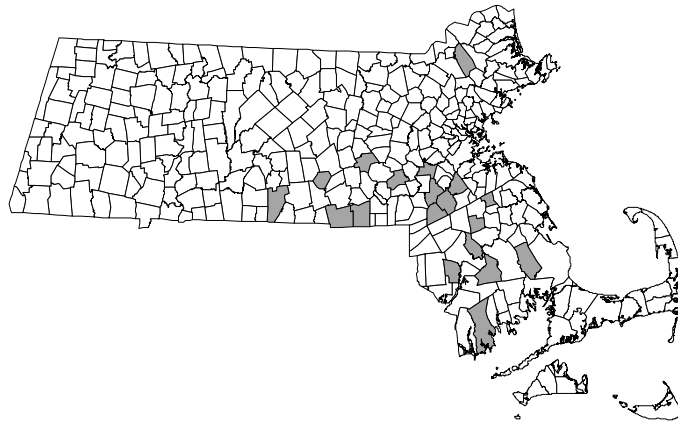
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S2S3	Peatlands, Forested Swamps	State List; Globally Rare

### Species Description

A tailed lycaenid butterfly, wingspan 26-28 mm. Underside of wings with reddish-brown ground color overlaid with bright, bluish-green scales and white spot lines; costal white spot of forewing set outward. Reddish-brown ground color not overlaid with green proximal to white spot lines. Larva dark bluish-green with oblique lateral white lines (cryptic on the host plant); final instar about 16 mm in length.

### Distribution and Abundance

There have been 19 occurrences of Hessel's Hairstreak documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Hessel's Hairstreak

### Habitat Description

Restricted to Atlantic white cedar swamps and bogs. Larvae feed exclusively on needles of Atlantic white cedar (*Chamaecyparis thyoides*). In Massachusetts, highbush blueberry (*Vaccinium corymbosum*) is a preferred nectar source, though chokeberries (*Aronia* spp.) and other flowers are also visited.

### Threats

- Loss of habitat (Atlantic white cedar swamps) to development, logging, and draining.
- Pesticide spraying.
- Lack of disturbance (fire, flooding) and/or excessive deer browsing, preventing regeneration of white cedar.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. No date. Hessel's Hairstreak (*Mitoura hesseli*) Fact Sheet.

## Frosted Elfin (*Callophrys irus*, State Special Concern)

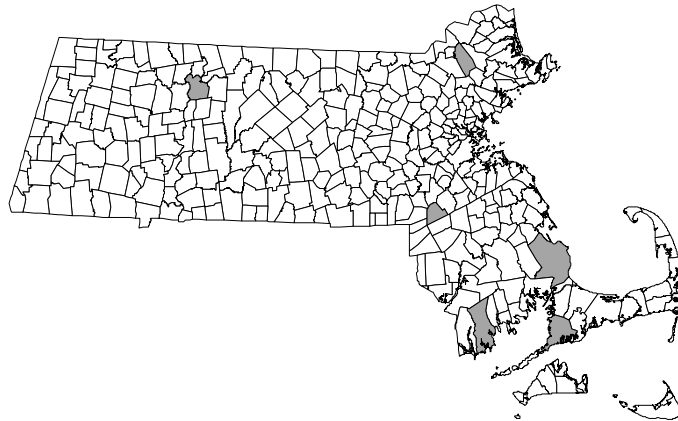
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S2S3	Grasslands, Pitch Pine/Scrub Oak	State List; Globally Rare

### Species Description

The Frosted Elfin is a small lycaenid butterfly. All four wings are brown both above and below; underside of hind wing dark brown in basal area, light brown overlaid with whitish-gray scaling along outer margin, with irregular, dark line and dark spot at outer angle. Male with dark brown scent patch on upper side of forewing at costal margin. Wingspan 22-35 mm. Larva the typical slug-like lycaenid form, pale green with white lateral line and pale, oblique dorsolateral dashes; setae short and dense.

### Distribution and Abundance

There have been ten occurrences of the Frosted Elfin documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Frosted Elfin

### Habitat Description

Xeric and open, disturbance-dependent habitats on sandy (occasionally rocky) soil, including grassy openings in pitch pine/scrub oak barrens and similar anthropogenic habitats such as powerline cuts, railways, old sand/gravel pits, and airports. Adult nectar sources include lupine (*Lupinus perennis*), cherries (*Prunus* spp.), blackberries (*Rubus* spp.), and blueberries (*Vaccinium* spp.). Larvae feed on lupine (*Lupinus perennis*) or wild indigo (*Baptisia tinctoria*).

### Threats

- Loss and degradation of habitat (especially pitch pine/scrub oak barrens) due to development and succession. This species' habitat requirements are often for open, fire-dependent habitats, so fire suppression contributes to habitat loss.
- Decline of lupine (*Lupinus perennis*).
- Pesticide spraying.
- In areas overpopulated with deer, excessive grazing of larval host plants.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Frosted Elfin (*Callophrys irus*) Fact Sheet.

## Bog Elfin (*Callophrys lanoraieensis*, State Threatened)

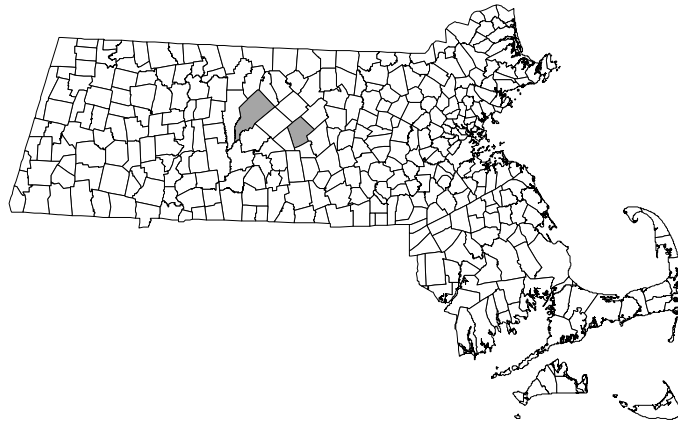
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S1	Peatlands, Forested Swamps	State List; Globally Rare

### Species Description

The Bog Elfin is a very small (wingspan 22-24 mm) lycaenid butterfly. All four wings are uniform dark brown above; underside of wings warmer, orange-brown to tan, striated with a complex pattern of black and white lines; underside of hind wing frosted gray along outer margin, and often with thick, curved black line and/or black spot near outer angle. Male with small, dark brown scent patch on upper side of forewing at costal margin. Larva the typical slug-like lycaenid form, green with wide, white lateral stripe.

### Distribution and Abundance

There have been two occurrences of the Bog Elfin documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Bog Elfin

### Habitat Description

The Bog Elfin inhabits black spruce (*Picea mariana*) swamps and bogs. Larvae feed on new growth at the branch tips of black spruce.

### Threats

- Destruction of habitat (black spruce bogs) by peat mining, draining, etc.
- Pesticide spraying.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Bog Elfin (*Callophrys lanoraieensis*) Fact Sheet.

## Gerhard's Underwing (*Catocala herodias gerhardi*, State Special Concern)

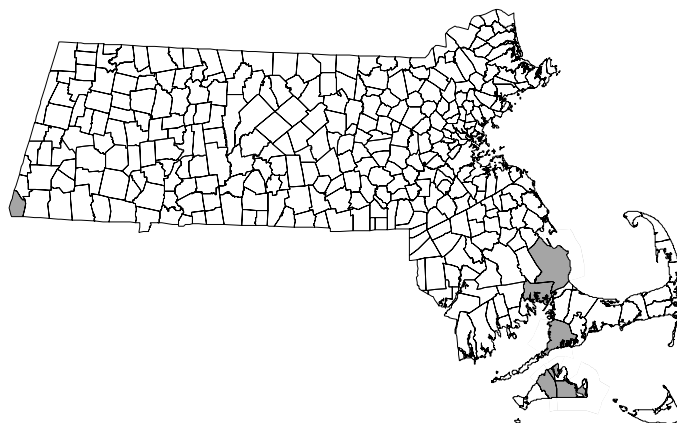
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3T3	S3	Pitch Pine/Scrub Oak, Rock Cliffs/ Ridgetops/ Talus Slopes	State List; Globally Rare

### Species Description

Gerhard's Underwing is a noctuid moth with grayish-brown forewings, dark longitudinal streaks along veins alternate with white streaks toward terminus; prominent white shading along costa. Hind wings banded with black and bright crimson, fringed with white. Wingspan 55-65 mm.

### Distribution and Abundance

There have been 34 occurrences of Gerhard's Underwing documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Gerhard's Underwing

### Habitat Description

Gerhard's Underwing inhabits xeric and open pitch pine/scrub oak barrens, especially scrub oak thickets on sandplains or rocky summits and ridges. The larvae feed on the catkins and new leaves of scrub oak (*Quercus ilicifolia*), and must complete feeding in the spring before the catkins drop off and the new leaves harden.

### Threats

- Loss and degradation of habitat, especially open, early successional pitch pine/scrub oak barrens. This habitat is fire-dependent, so fire suppression contributes to habitat loss.
- Pesticide spraying.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1994. Gerhard's Underwing Moth (*Catocala herodias gerhardi*) Fact Sheet.

## Precious Underwing Moth (*Catocala pretiosa pretiosa*, State Endangered)

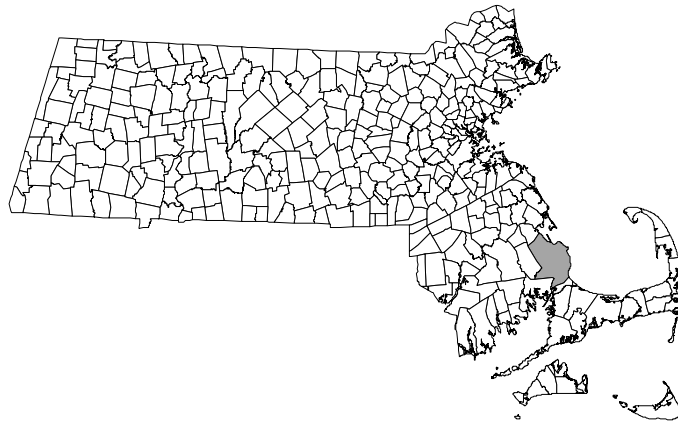
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4T2T3	S1	Shrub Swamps, Forested Swamps	State List; Globally Rare

### Species Description

The Precious Underwing is a noctuid moth with mottled forewings, antemedian and postmedian lines jagged, black, basal area dark brown, median area largely white to gray, overlaid with olive-green shading, postmedian area medium brown and then olive green toward costa, with black apical dash. Hind wings banded with black and yellowish-orange. Wingspan 42-46 mm.

### Distribution and Abundance

There is one documented occurrence of Precious Underwing Moth documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Precious Underwing Moth

### Habitat Description

The Precious Underwing Moth inhabits acidic shrub swamps and forested riparian floodplains within coastal sandplain pitch pine/scrub oak barrens. The primary larval host plant is Red Chokeberry (*Aronia arbutifolia*); other Rosaceae may be used occasionally. Larvae feed nocturnally on young foliage and developing fruits.

### Threats

- Loss and degradation of habitat (acidic shrub swamps and floodplains within coastal sandplain barrens).
- Pesticide spraying.
- Excessive deer browsing may prevent recruitment of *Aronia* saplings.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Precious Underwing Moth (*Catocala pretiosa pretiosa*) Fact Sheet.

## Waxed Sallow Moth (*Chaetagnalea cerata*, State Special Concern)

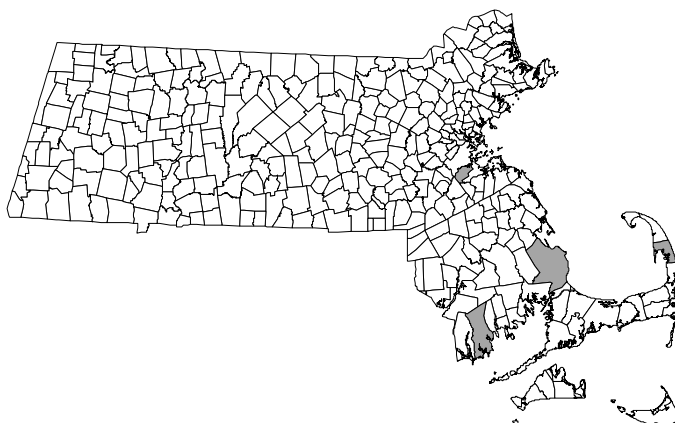
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S2S3	Pitch Pine/Scrub Oak	State List; Globally Rare

### Species Description

The Waxed Sallow Moth is an owlet (family Noctuidae). Forewings grayish-brown, tinted with rose; antemedial and postmedial lines maroon; orbicular and reniform spots round, narrowly outlined in yellowish-tan and then maroon; narrow yellow lines along main veins. Hind wings nondescript, grayish-brown. Wings of freshly emerged individuals have a waxy sheen. Wingspan 35-38 mm.

### Distribution and Abundance

There have been nine occurrences of the Waxed Sallow Moth documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Waxed Sallow Moth

### Habitat Description

The Waxed Sallow Moth inhabits sandplain pitch pine–scrub oak barrens and heathlands. The only documented larval host is black huckleberry (*Gaylussacia baccata*), but larvae probably also feed on lowbush blueberry (*Vaccinium* spp.), and possibly also *Quercus ilicifolia* and other shrubs.

### Threats

- Loss and degradation of habitat, especially pitch pine/scrub oak barrens and heathlands. This species' habitat preferences are for fire-dependent habitats, so fire suppression contributes to habitat loss.
- Pesticide spraying.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Waxed Sallow Moth (*Chaetagnalea cerata*) Fact Sheet.

## Melsheimer's Sack Bearer (*Cicinnus melsheimeri*, State Threatened)

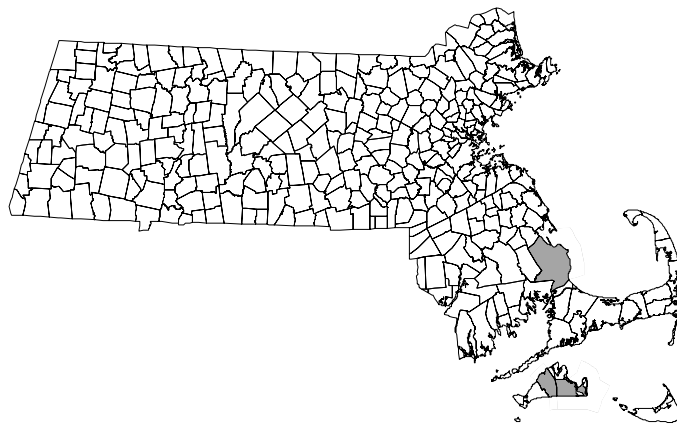
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S2S3	Pitch Pine/Scrub Oak	State List

### Species Description

Melsheimer's Sack Bearer is a mimallonid moth with pale pink wings overlaid with black speckling; gray postmedial lines and small, gray reniform spot; on forewing postmedial line angles sharply inward near costa. Forewings hooked at apex. Wingspan 35-50 mm. Length of full-grown larva approximately 45 mm. Larva constructs a portable, protective shelter ("sack") out of pieces of leaves and silk.

### Distribution and Abundance

There have been 18 occurrences of Melsheimer's Sack Bearer documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Melsheimer's Sack Bearer

### Habitat Description

In Massachusetts Melsheimer's Sack Bearer inhabits sandplain pitch pine/scrub oak barrens, especially scrub oak thickets within frost pockets. All occurrences are on the coastal plain, between sea level and 200 feet in elevation. Larvae feed exclusively on scrub oak (*Quercus ilicifolia*) in Massachusetts; other oaks (*Quercus* spp.) are used in other parts of the species' range.

### Threats

- Loss and degradation of habitat, especially open, early successional pitch pine/scrub oak barrens. This habitat is fire-dependent, so fire suppression contributes to habitat loss.
- Pesticide spraying.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1994. Melsheimer's Sack-bearer (*Cicinnus melsheimeri*) Fact Sheet.



## Chain Dot Geometer (*Cingilia catenaria*, State Special Concern)

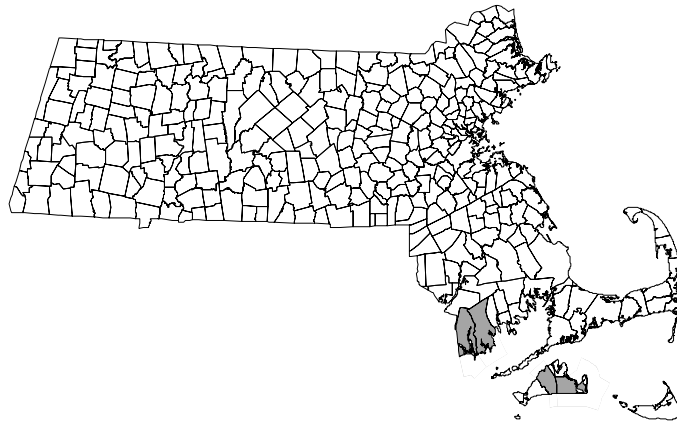
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S2S3	Pitch Pine/Scrub Oak, Peatlands, Shrub Swamps, Coastal Dunes/Beaches/ Small Islands	State List

### Species Description

Bright yellow patches on head and thorax at base of wings, body otherwise white; wings white with antemedial, postmedial, and terminal “chains” (lines) of black dots and black discal spots. Wingspan 30-40 mm. Larva a bright yellow inchworm, spiracles surrounded by white and flanked with black patches, 25-30 mm when fully grown.

### Distribution and Abundance

There have been 25 occurrences of Chain Dot Geometer documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Chain Dot Geometer

### Habitat Description

The Chain Dot Geometer inhabits open coastal plain habitats, especially heathlands, shrubby dunes and bluffs, and acidic shrub swamps and bogs, occasionally also pitch pine/scrub oak barrens. Huckleberries (*Gaylussacia* spp.), blueberries (*Vaccinium* spp.), and bayberry and gale (*Myrica* spp.) are favored larval host plants, but this species is widely polyphagous, especially during “outbreaks.”

### Threats

- Loss and degradation of habitat (especially coastal plain shrublands and shrub wetlands) due to development and succession. This species’ habitat requirements are for open, fire-dependent habitats, so fire suppression contributes to habitat loss.
- Spraying with insecticides.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Chain Dot Geometer (*Cingilia catenaria*) Fact Sheet.

## Unexpected Cynia (*Cynia inopinatus*, State Threatened)

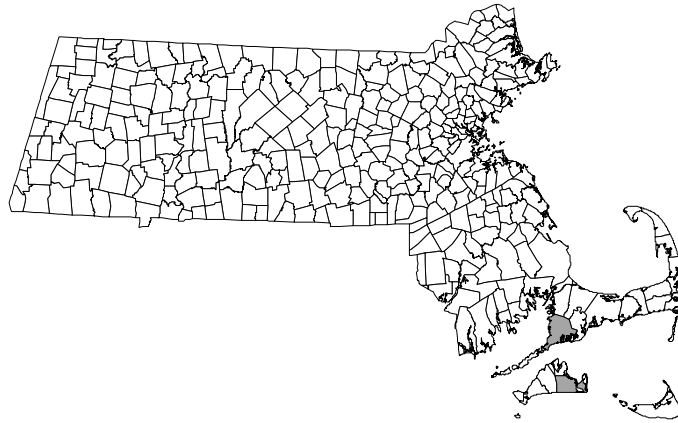
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1S2	Grasslands	State List

### Species Description

The Unexpected Cynia is an arctiid moth, head and abdomen of yellow, with dorsal and lateral black spots on abdomen. Wings grayish-white, forewings with yellow costa, extending from base about  $\frac{3}{4}$  the distance to wing apex. Wingspan 28-36 mm. Larvae hairy, orange-brown, like a small Woolly Bear with no black band.

### Distribution and Abundance

There have been two occurrences of the Unexpected Cynia documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Unexpected Cynia

### Habitat Description

The Unexpected Cynia inhabits open, grassy habitats with abundant milkweeds (*Asclepias* spp.), especially sandplain grasslands. Larvae feed on milkweeds (*Asclepias* spp.), especially butterfly weed (*A. tuberosa*).

### Threats

- Loss of open, grassy habitats to succession. This species' habitat requirements are for fire-dependent habitats, so fire suppression contributes to habitat loss.
- Pesticide spraying.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Unexpected Cynia (*Cynia inopinatus*) Fact Sheet.

## Three-lined Angle Moth (*Digrammia eremiata*, State Threatened)

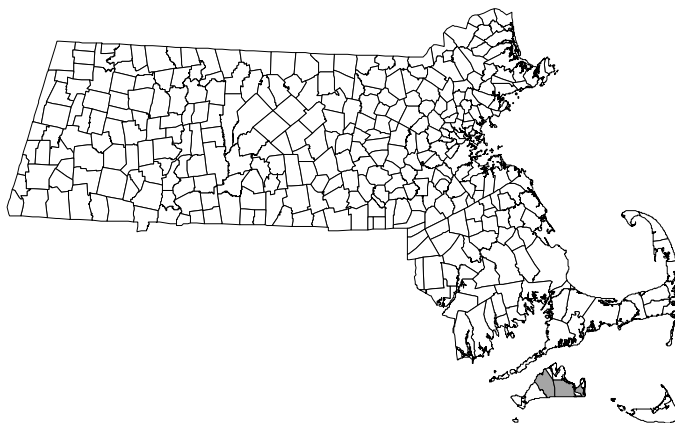
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1	Grasslands, Pitch Pine/Scrub Oak	State List

### Species Description

The Three-lined Angle Moth is a small, dirty white to gray geometrid, with three, brownish-gray, transverse lines on the upper surface of the wings and some ochre coloring beneath. Formerly placed in the genus *Semiothisa*.

### Distribution and Abundance

There have been two occurrences of the Three-lined Angle Moth documented in Massachusetts since 1980 (NHESP database, accessed December, 2004), both on Martha's Vineyard. Historically, it also occurred on Nantucket. This species potentially also occur on Cape Cod and/or in Plymouth County.



Massachusetts Towns with Recent Occurrences of Three-lined Angle Moth

### Habitat Description

The Three-lined Angle Moth inhabits sandplain habitats, especially sandplain grasslands but also open areas within pitch pine/scrub oak barrens. Larvae feed on goat's rue (*Tephrosia virginiana*).

### Threats

- Loss and degradation of habitat (sandplain grasslands and pitch pine/scrub oak barrens) due to development, succession, and invasion by exotic plants. This species' habitat is fire-dependent, so fire suppression contributes to habitat loss.
- Spraying with insecticides.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Three-lined Angle Moth (*Digrammia eremiata*) Fact Sheet.

## Imperial Moth (*Eacles imperialis*, State Threatened)

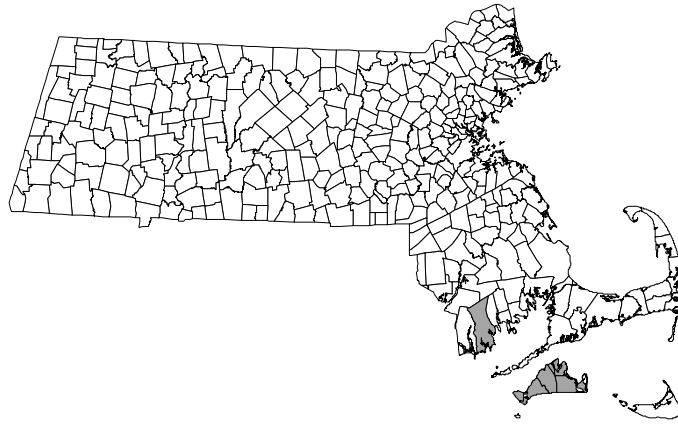
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S1	Pitch Pine/Scrub Oak	State List

### Species Description

A gigantic (wingspan 80 to 170 mm), bright yellow saturniid moth, variably shaded and spotted with purplish-brown and peppered with black. The female is larger than the male, with less shading and spotting on average. Larva green or brown, with white spiracular spots ringed with black; head yellow with black stripes; spiny yellow horns located dorsally on second and third thoracic segments; also a single yellow horn at posterior of abdomen; body with long, sparse, colorless setae; 75-100 mm long in final instar.

### Distribution and Abundance

There have been 15 occurrences of Imperial Moth documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). The only remaining population is on Martha's Vineyard; the single record from Dartmouth was almost certainly a stray. A recently initiated reintroduction attempt in Plymouth County is ongoing.



Massachusetts Towns with Recent Occurrences of Imperial Moth

### Habitat Description

In Massachusetts, the Imperial Moth occurs in pitch pine/scrub oak barrens and open pine/oak forests, and larvae feed almost exclusively on pitch pine (*Pinus rigida*). This species is much more polyphagous rangewide (38 host plant genera have been recorded).

### Threats

- Loss, fragmentation, and degradation of habitat (pitch pine/scrub oak barrens and open pine/oak woodland).
- Spraying with insecticides.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. No date. Imperial Moth (*Eacles imperialis*) Fact Sheet.

## Early Hairstreak (*Erora laeta*, State Threatened)

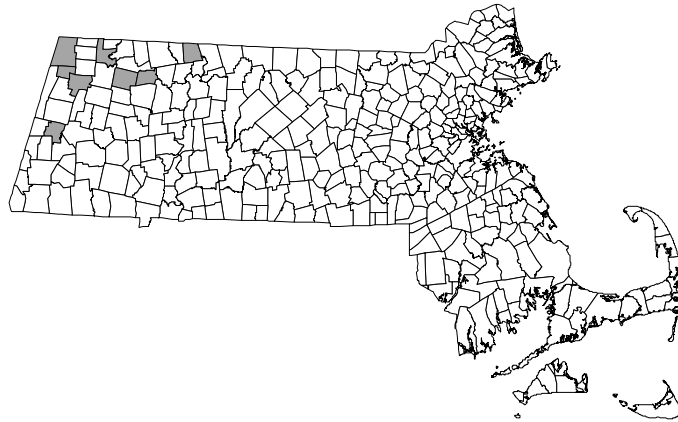
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S1S2	Upland Forest	State List; Globally Rare

### Species Description

Upper side of wings iridescent blue with black margins in female, male mostly black with blue only on the outer angle. Underside of wings in both sexes from lime-green, with orange postmedian line edged in white and a submarginal row of small orange spots. There are no tails on the hindwings as are found in many other hairstreaks. Wingspan 25-35 mm. Mature larva reaching a length of about 12 mm, yellowish green to rust brown, with reddish patches of varying size and extent, dorsal surface covered with numerous short spines except for a small, diamond-shaped bald area on the thorax, paired dorsal swellings on each segment giving the larva a serrate profile.

### Distribution and Abundance

There have been eight occurrences of Early Hairstreak documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Early Hairstreak

### Habitat Description

Early Hairstreaks inhabit mature northern hardwood forests with a sufficient complement of beech (*Fagus grandifolia*). This butterfly is most often encountered alighting on bare ground along dirt roads, paths, and ridgetops to “puddle” or bask; more rarely it is seen nectaring along streams or in fields and other openings in the forest. In Massachusetts, the Early Hairstreak has been observed nectaring at strawberry (*Fragaria virginiana*) and pin cherry (*Prunus pennsylvanica*). Beech (*Fagus grandifolia*) is the larval host, with larvae consuming foliage and developing nuts.

### Threats

- Destruction of forest habitat by logging, development, etc.
- Alteration of habitat that causes loss of key resources, including beech trees, nectar sources, and puddling sites.
- Beech bark disease.
- Pesticide spraying.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Early Hairstreak (*Erora laeta*) Fact Sheet.

## Persius Duskywing (*Erynnis persius persius*, State Endangered)

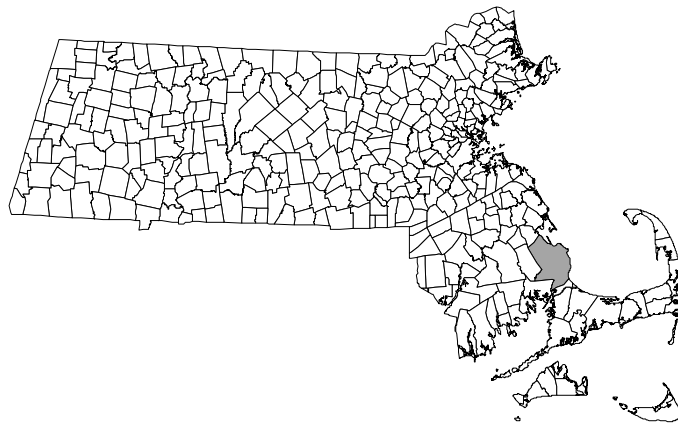
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5T1T3	S1	Grasslands, Pitch Pine/Scrub Oak	State List; Globally Rare

### Species Description

The Persius Duskywing is a dark brown, almost black, skipper butterfly, with small, white apical spots on the forewing and pale marginal and submarginal spots on the hind wings. Males have an abundance of short, white setae on the forewings that give them a “soft” appearance. Wingspan 25-35 mm. Last-instar larvae are light green with faint, pale yellow dorsolateral stripes, a green “heart line,” and small white tubercles; the head is roughly sculptured with apical knobs, tan to dark brown in color with a dark, W-shaped mark on frons; 16-23 mm long in final instar.

### Distribution and Abundance

*Erynnis persius persius* refers to the disjunct (and rare) populations east of the Great Plains; at least two other more common and widespread subspecies exist in the west. There have been three occurrences of the Persius Duskywing documented in Massachusetts since 1980 (NHESP database, accessed December, 2004), all in Plymouth.



Massachusetts Towns with Recent Occurrences of Persius Duskywing

### Habitat Description

Xeric, open oak woodland, sandplain pitch pine–scrub oak barrens, and other open, grassy, disturbance-dependent habitats with wild indigo (*Baptisia tinctoria*) or lupine (*Lupinus perennis*), which are the larval hosts.

### Threats

- Loss of and degradation of habitat (pitch pine/scrub oak barrens) due to development and succession. This species' habitat is fire-dependent, so fire suppression contributes to habitat loss.
- Decline of lupine (*Lupinus perennis*).
- Pesticide spraying.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1994. Persius Dusky-Wing Skipper (*Erynnis persius persius*) Fact Sheet.

## Sandplain Euchlaena (*Euchlaena madusaria*, State Special Concern)

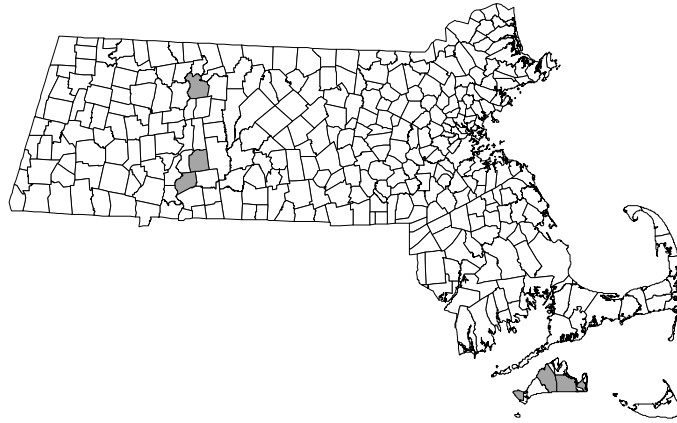
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S2S3	Grasslands, Pitch Pine/Scrub Oak	State List

### Species Description

The Sandplain Euchlaena is a geometrid moth with both forewings and hind wings light tan wings basally, darker reddish-tan outside brick-red postmedian lines, peppered with black; forewings with wide, white apical dash. Wingspan 33-35 mm.

### Distribution and Abundance

There have been nine occurrences of Sandplain Euchlaena documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Sandplain Euchlaena

### Habitat Description

Sandplain Euchlaena moths inhabit heathlands and other disturbance-dependent habitats. The primary larval host plants are heaths such as lowbush blueberry (*Vaccinium* spp.).

### Threats

- Loss and degradation of habitat due to development, succession, and invasion by exotic plants. This species' habitat is fire-dependent, so fire suppression contributes to habitat loss.
- Spraying with insecticides.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Sandplain Euchlaena (*Euchlaena madusaria*) Fact Sheet.

## Dion Skipper (*Euphyes dion*, State Threatened)

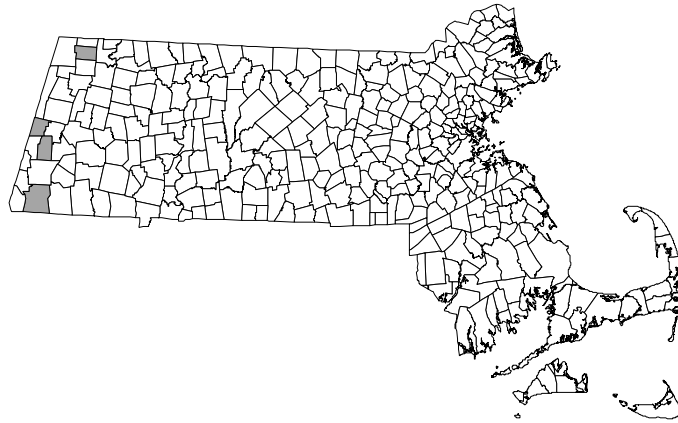
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1S2	Marshes & Wet Meadows	State List

### Species Description

The Dion Skipper is a relatively large (wingspan 37-45 mm) hesperiine skipper, male orange above with wide black margins and prominent black forewing dash, female mostly black above with two orange forewing spots; both sexes bright orange below, hind wing with two radial yellow rays extending from basal area to wing margin.

### Distribution and Abundance

There have been four occurrences of the Dion Skipper documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Dion Skipper

### Habitat Description

The Dion Skipper inhabits open, sunny sedge wetlands, typically calcareous fens in Massachusetts, but also open shrub swamps, marshes, bogs, streamsides, and wet meadows. Adult nectar sources include milkweed (*Asclepias* spp.) and shrubby cinquefoil (*Pentaphylloides floribunda*). Larvae feed on sedges such as marsh sedge (*Carex lacustris*).

### Threats

- Loss and degradation of habitat (sedge wetlands) due to development, alteration of natural hydrology, or invasive plant species.
- Pesticide spraying.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Dion Skipper (*Euphyes dion*) Fact Sheet.



## The Pink Streak (*Faronta rubripennis*, State Threatened)

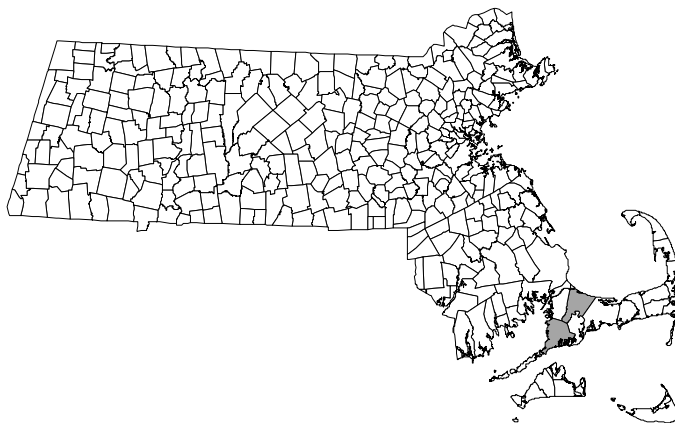
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S1	Grasslands	State List; Globally Rare

### Species Description

The Pink Streak is a straw-colored noctuid moth with prominent pink streaks on the forewings; hindwings white. Wingspan 32-37 mm. The larva is usually brown but sometimes green, with whitish-yellow middorsal line and yellow subdorsal lines, ~25 mm in the final instar.

### Distribution and Abundance

There have been two occurrences of the Pink Streak documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). Historically, this species occurred on both Martha's Vineyard and Nantucket.



Massachusetts Towns with Recent Occurrences of The Pink Streak

### Habitat Description

Coastal sandplain grasslands and dunes are the preferred habitat of The Pink Streak; occasionally, similar anthropogenic habitats such as airports and powerline cuts are used. The larvae feed on switchgrass (*Panicum virgatum*).

### Threats

- Loss and degradation of habitat (coastal sandplain grasslands and dunes) due to development, succession, and invasion by exotic plants. This species inhabits open, fire-dependent habitats, so fire suppression contributes to habitat loss.
- Spraying with insecticides.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. The Pink Streak (*Faronta rubripennis*) Fact Sheet.

## Phyllira Tiger Moth (*Grammia phyllira*, State Endangered)

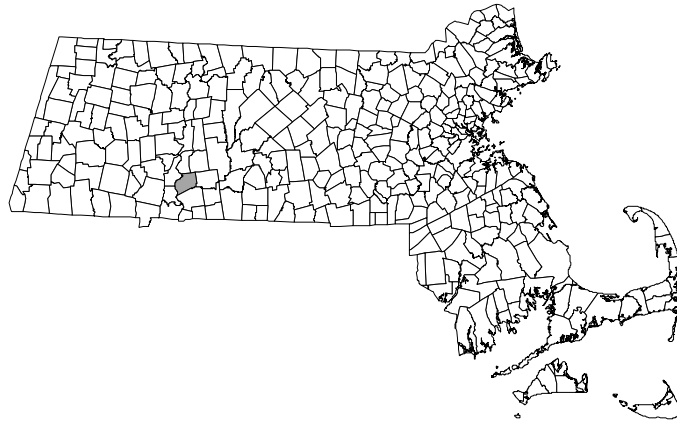
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1	Grasslands	State List

### Species Description

The Phyllira Tiger Moth (family Arctiidae) has a pinkish-peach colored thorax, striped with black, and a crimson abdomen with a broad black stripe dorsally and black spots laterally. Forewings black with broad pinkish-peach stripes, alternating with narrow stripes of the same color in form *oithona*. Hind wings bright crimson with black blotches along hind margin. Wingspan 35-40 mm. The Oithona Tiger Moth, formerly thought to be a separate species (*Grammia oithona*), has recently been demonstrated to be a form of the Phyllira Tiger Moth.

### Distribution and Abundance

There has been one occurrence of Phyllira Tiger Moth documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). Historically, this species was more widespread in the Connecticut River Valley and also occurred on Nantucket.



Massachusetts Towns with Recent Occurrences of Phyllira Tiger Moth

### Habitat Description

The Phyllira Tiger Moth is a prairie species that inhabits xeric sandplain grasslands in the northeastern U.S. Larvae are polyphagous on low-growing herbaceous plants.

### Threats

- Loss and degradation of habitat (sandplain grasslands) due to development and suppression of fire and other natural disturbance regimes.
- Spraying with insecticides.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Phyllira Tiger Moth (*Grammia phyllira*) Fact Sheet.

## Slender Clearwing Sphinx Moth (*Hemaris gracilis*, State Special Concern)

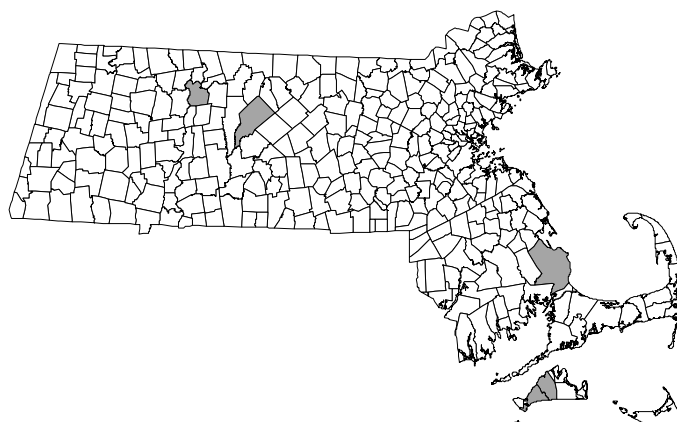
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S2S3	Peatlands, Shrub Swamps, Pitch Pine/Scrub Oak, Rock Cliffs/ Ridgetops/ Talus Slopes	State List; Globally Rare

### Species Description

The Slender Clearwing Sphinx is a day-flying “hummingbird moth” with wings largely unscaled and transparent except for reddish-brown margins; body olive in color dorsally, except for anterior of abdomen, which is reddish-brown; reddish-brown line on ventral surface beneath each wing base. Wingspan 40-45 mm. Larva a small “hornworm,” yellowish-green in color, with thin, yellow dorsolateral lines and pink spiracles; venter dark reddish to purplish-brown; caudal horn short, light reddish-brown; 40-48 mm in final instar.

### Distribution and Abundance

There have been seven occurrences of Slender Clearwing Sphinx Moth documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Slender Clearwing Sphinx Moth

### Habitat Description

Pitch pine–scrub oak barrens and heathlands on sandplains or rocky summits and ridges (associated with lowbush blueberry); also acidic bogs and swamps with ericaceous vegetation. Adults are diurnal and hover to nectar at flowers, especially blueberry (*Vaccinium*) and maleberry (*Lyonia*). Lowbush blueberry (*Vaccinium pallidum*) is a known larval host in Massachusetts; other blueberries (*Vaccinium* spp.) are probably used, especially in other parts of the species’ range.

### Threats

- Loss and degradation of habitat, especially open, early successional pitch pine/scrub oak barrens and heathlands. This habitat is fire-dependent, so fire suppression contributes to habitat loss.
- Pesticide spraying.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Slender Clearwing Sphinx Moth (*Hemaris gracilis*) Fact Sheet.

## Barrens Buckmoth (*Hemileuca maia*, State Special Concern)

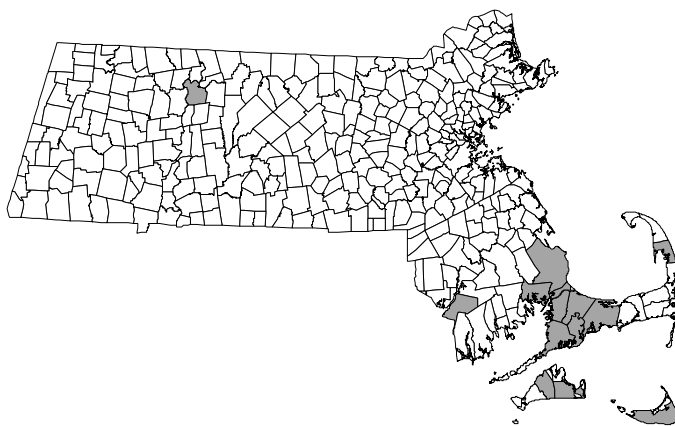
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G5	S3	Pitch Pine/Scrub Oak	State List

### Species Description

Both forewings and hind wings black proximally and distally, median area with yellowish-white, semi-translucent band, reniform and discal spots yellow, elongate; male with bright orange on thorax and anterior of abdomen; wingspan 50-75 mm, females larger than males. Larvae black, often with yellow spiracular stripe and/or yellowish-white speckling; long, branching spines dorsally that can inflict a painful sting; reaching a length of 45-60 mm.

### Distribution and Abundance

There have been 36 occurrences of Barrens Buckmoth documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Barrens Buckmoth

### Habitat Description

Xeric, open habitats with extensive scrub oak thickets, especially sandplain pitch pine–scrub oak barrens and maritime shrublands. The larval host plant is primarily scrub oak (*Quercus ilicifolia*), very rarely other oaks; wandering late-instar larvae are occasionally found on other hosts.

### Threats

- Loss, fragmentation, and degradation of habitat, especially open-canopy pitch pine/scrub oak barrens. This habitat is fire-dependent, so fire suppression contributes to habitat loss.
- Pesticide spraying.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1994. Barrens Buck Moth (*Hemileuca maia*) Fact Sheet.

## Buchholz's Gray (*Hypomecis buchholzaria*, State Endangered)

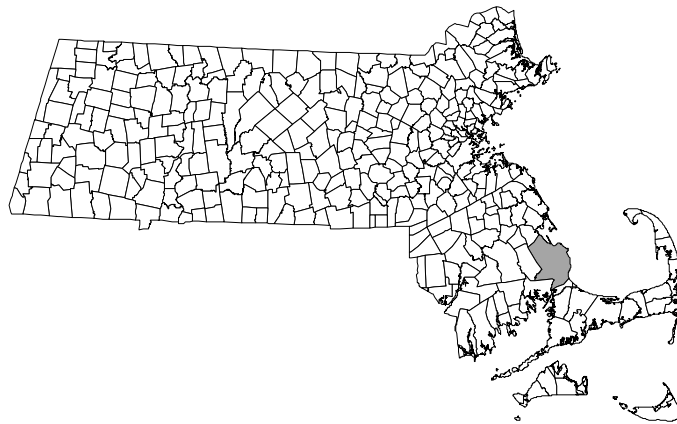
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S1	Pitch Pine/Scrub Oak	State List; Globally Rare

### Species Description

Buchholz's Gray is grayish to brownish-black, geometrid moth, with spots and lines of the wing pattern very indistinct. Wingspan 32-36 mm.

### Distribution and Abundance

There has been one occurrence of Buchholz's Gray documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Buchholz's Gray

### Habitat Description

Buchholz's Gray inhabits xeric, open habitats on sandy soil, especially sandplain pitch pine/scrub oak barrens. Natural larval host(s) are undocumented; captive larvae accept sweetfern (*Comptonia peregrina*), bayberry and gale (*Myrica* spp.), and scrub oak (*Quercus ilicifolia*).

### Threats

- Loss and degradation of habitat, especially open-canopy pitch pine/scrub oak barrens. This habitat is fire-dependent, so fire suppression contributes to habitat loss.
- Pesticide spraying.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Buchholz's Gray (*Hypomecis buchholzaria*) Fact Sheet.

## Pine Barrens Itame (*Itame* sp. 1 nr. *inextricata*, State Special Concern)

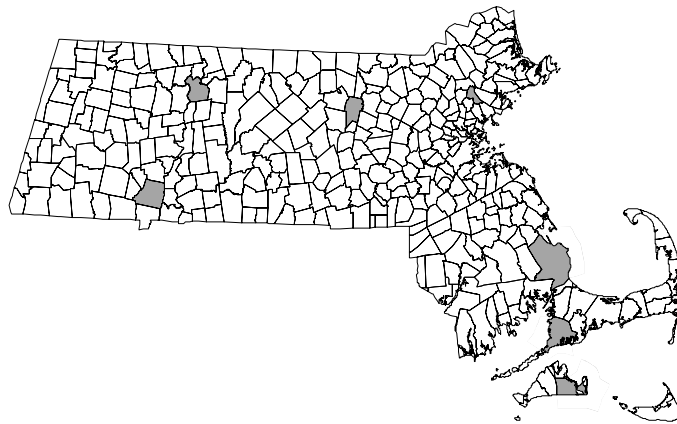
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S2S3	Pitch Pine/Scrub Oak	State List; Globally Rare

### Species Description

The Pine Barrens Itame, a geometrid moth, has rather plain, brownish-gray forewings with faint patterning; hind wings cream-colored with small dark spots. Wingspan 20-22 mm.

### Distribution and Abundance

There have been 16 occurrences of Pine Barrens Itame documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Pine Barrens Itame

### Habitat Description

The Pine Barrens Itame inhabits pitch pine–scrub oak barrens on sandplains and rocky slopes and ridges. Larvae feed on scrub oak (*Quercus ilicifolia*).

### Threats

- Loss and degradation of habitat, especially open-canopy pitch pine/scrub oak barrens. This habitat is fire-dependent, so fire suppression contributes to habitat loss.
- Pesticide spraying.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Pine Barrens Itame (*Itame* sp. 1 nr. *inextricata*) Fact Sheet.

## Pale Green Pinion Moth (*Lithophane viridipallens*, State Special Concern)

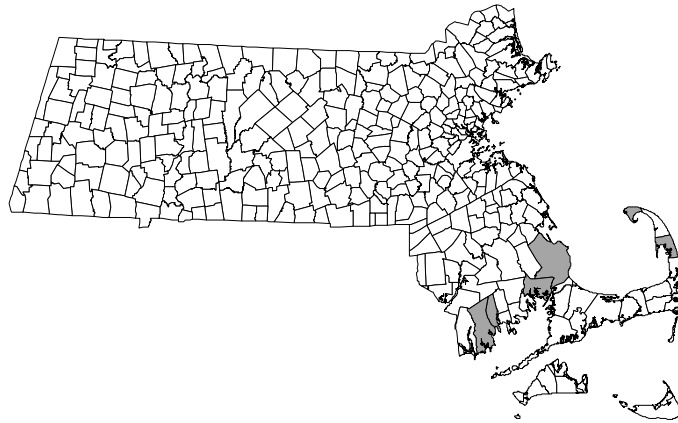
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1S3	Shrub Swamps, Forested Swamps	State List

### Species Description

The Pale Green Pinion Moth is a noctuid moth with pale, silvery gray forewings with a greenish hue, area between reniform and orbicular spots shaded with black; hind wings nondescript, dark gray. Wingspan 38-42 mm.

### Distribution and Abundance

There have been six occurrences of Pale Green Pinion Moth documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Pale Green Pinion Moth

### Habitat Description

In Massachusetts, the Pale Green Pinion Moth inhabits coastal plain oak/holly swamp forests and acidic shrub swamps. The larval host plants are undocumented in Massachusetts, but probably include a variety of acidic wetland shrubs such as hollies (*Ilex* spp.), sweet pepper-bush (*Clethra alnifolia*), swamp-fetterbush (*Leucothoe racemosa*), maleberry (*Lyonia ligustrina*), and highbush blueberry (*Vaccinium corymbosum*).

### Threats

- Loss and degradation of habitat.
- Spraying with insecticides.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. No date. Pale Green Pinion Moth (*Lithophane viridipallens*) Fact Sheet.

## Twilight Moth (*Lycia rachelae*, State Endangered)

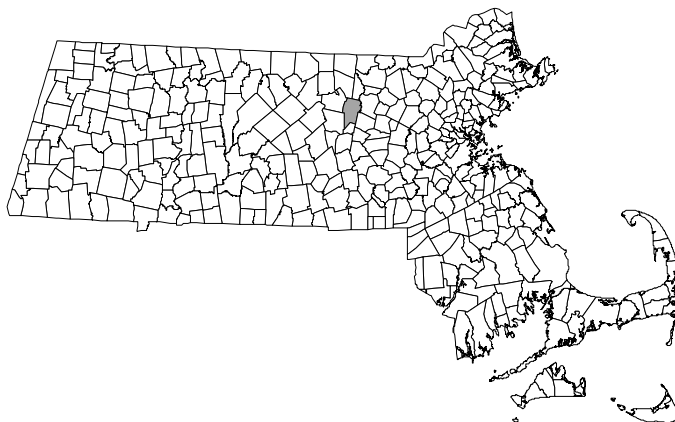
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1	Pitch Pine/Scrub Oak	State List

### Species Description

The Twilight Moth is in the family Geometridae; males have partially transparent (unscaled) wings, costal margin of forewing and veins and fringes of all wings scaled with black, orange scaling overlaying black along costa of forewing, median and basal areas of all wings with some white scaling; wingspan 27-30 mm. Female wingless. Both sexes with stubby body, thorax and abdomen black, fringed with long, white setae, orange stripe dorsally.

### Distribution and Abundance

There has been one occurrence of Twilight Moth documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). Records indicate that this species was found throughout the Boston area and northeastern Massachusetts prior to 1934. The only recent Massachusetts records are from Lancaster in 1994 and 2002.



Massachusetts Towns with Recent Occurrences of Twilight Moth

### Habitat Description

The habitat for the Twilight Moth is poorly understood and probably somewhat variable; the single Massachusetts occurrence inhabits pitch pine/scrub oak barrens. Larval host plants are undocumented in Massachusetts; elsewhere the Twilight Moth feeds on various woody plants, especially poplars and willows (Salicaceae), cherries and apples (Rosaceae), and birches and alders (Betulaceae).

### Threats

- Loss and degradation of habitat (pitch pine/scrub oak barrens).
- Spraying with insecticides.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Twilight Moth (*Lycia rachelae*) Fact Sheet.



## Pine Barrens Lycia (*Lycia ypsilon*, State Threatened)

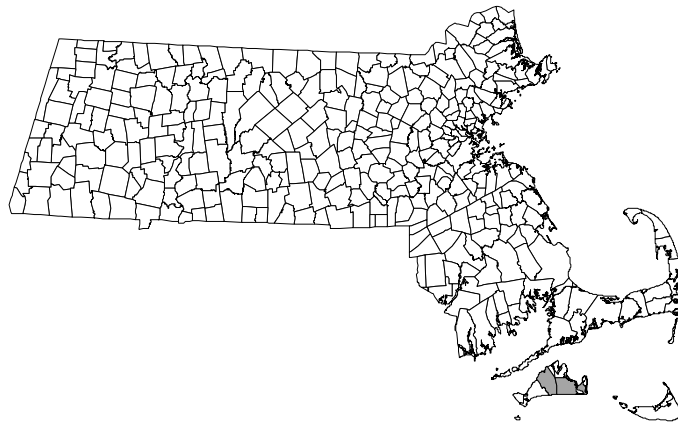
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1	Pitch Pine/Scrub Oak	State List

### Species Description

The Pine Barrens Lycia is a geometrid moth, males with whitish-gray wings, overlaid with brownish-black basally on forewings and in outer half of median area on all wings; wingspan 30-35 mm. Female wingless. Both sexes have a stubby body, thorax and abdomen brownish-black, frosted with white.

### Distribution and Abundance

There have been four occurrences of Pine Barrens Lycia documented in Massachusetts since 1980, all on Martha's Vineyard (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Pine Barrens Lycia

### Habitat Description

In Massachusetts, *Lycia ypsilon* occurs in pitch pine/scrub oak barrens and heathlands. Larval host plants are undocumented in Massachusetts; elsewhere it feeds on various woody plants, especially cherries, apples, and shadbushes (Rosaceae).

### Threats

- Loss and degradation of habitat (pitch pine/scrub oak barrens).
- Spraying with insecticides.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Pine Barrens Lycia (*Lycia ypsilon*) Fact Sheet.

## Barrens Metarranthis (*Metarranthis apiciaria*, State Endangered)

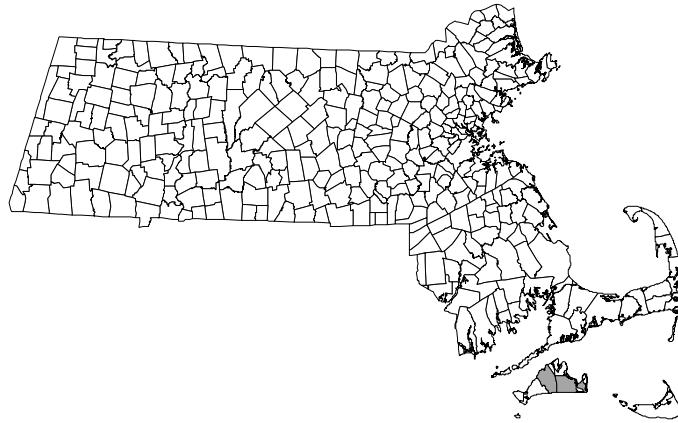
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
GU	S1	Pitch Pine/Scrub Oak	State List

### Species Description

The Barrens Metarranthis is a geometrid moth with smoothly curved, double postmedian lines on wings, brick-red distally and white proximally, area inside postmedian lines shaded with brick-red, area outside lines mostly white, reniform and discal spots small, indistinct. Wingspan 28-32 mm.

### Distribution and Abundance

There have been five occurrences of Barrens Metarranthis documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Barrens Metarranthis

### Habitat Description

In Massachusetts the Barrens Metarranthis occurs in pitch pine/scrub oak barrens. The larval host plant(s) are unknown.

### Threats

- Loss and degradation of habitat (pitch pine/scrub oak barrens); this habitat is fire-dependent, so fire suppression contributes to habitat loss.
- Pesticide spraying.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Barrens Metarranthis (*Metarranthis apiciaria*) Fact Sheet.

## Coastal Swamp Metarranthis (*Metarranthis pilosaria*, State Special Concern)

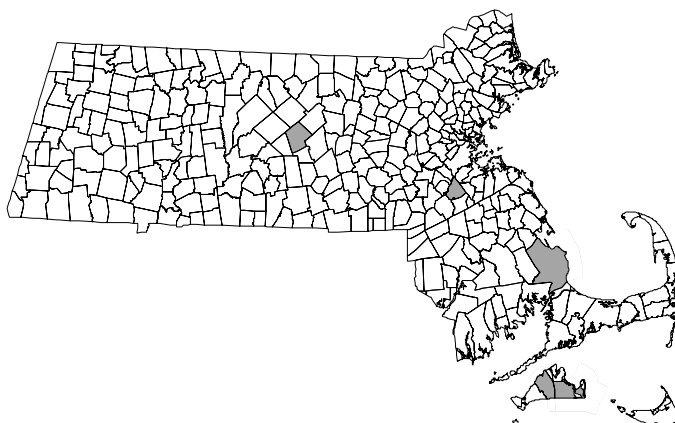
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S2S3	Peatlands, Shrub Swamps	State List; Globally Rare

### Species Description

The Coastal Swamp Metarranthis is a geometrid moth with smoothly curved postmedian lines on all wings, outlined with black on hind wings, area inside postmedian lines shaded with reddish-brown, area outside pinkish-tan, reniform spots absent, discal spots small, black, all wings peppered with black; bright orange ventrally. Wingspan 24-28 mm.

### Distribution and Abundance

There have been 19 occurrences of Coastal Swamp Metarranthis documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Coastal Swamp Metarranthis

### Habitat Description

Coastal Swamp Metarranthis moths inhabit open, acidic wetlands with ericaceous vegetation, especially shrub swamps and bogs, often within sandplain pitch pine/scrub oak barrens. Adults are often encountered in dry barrens a good distance from any wetland, indicating that this species may use these areas as habitat, presumably so long as there is ericaceous vegetation. Cranberry (*Vaccinium macrocarpon*) is a documented larval host, leatherleaf (*Chamaedaphne calyculata*) is likely also used; in dry barrens habitat the most likely larval hosts are lowbush blueberries (*Vaccinium pallidum* and *V. angustifolium*).

### Threats

- Loss and degradation of habitat (ericaceous shrub swamps and bogs, pitch pine/scrub oak barrens).
- Pesticide spraying.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Coastal Swamp Metarranthis (*Metarranthis pilo*) Fact Sheet.

## Northern Brocade Moth (*Neoligia semicana*, State Special Concern)

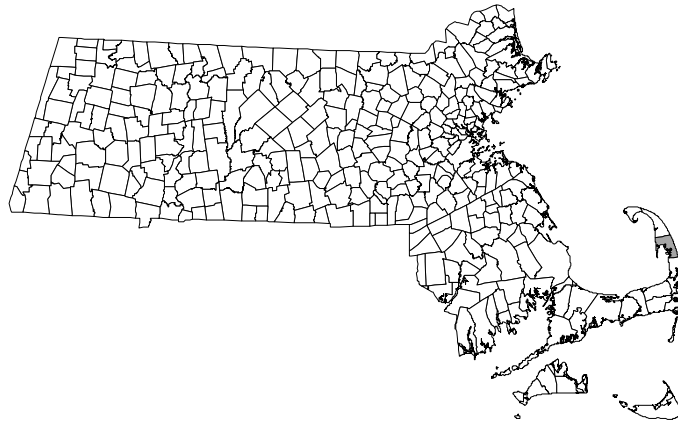
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1	Marshes & Wet Meadows, Salt Marsh	State List

### Species Description

The Northern Brocade Moth is a small (wingspan 18-20 mm) noctuid moth, shaded brown basally and whitish-gray beyond postmedian lines, postmedian lines and reniform spots outlined with white.

### Distribution and Abundance

There have been two occurrences of the Northern Brocade Moth documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Northern Brocade Moth

### Habitat Description

The habitat preferences of the Northern Brocade Moth are poorly understood. In Massachusetts, it is associated with brackish coastal marshes. The larval host plant(s) are unknown.

### Threats

- Loss and degradation of habitat (brackish coastal marshes).
- Spraying with insecticides.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Northern Brocade Moth (*Neoligia semicana*) Fact Sheet.

## Dune Noctuid Moth (*Oncocnemis riparia*, State Special Concern)

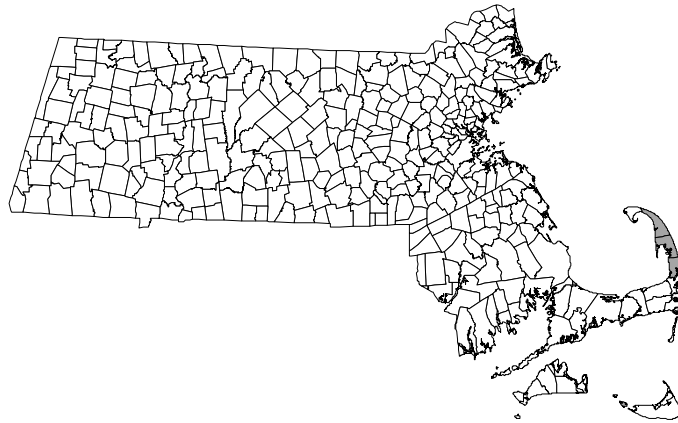
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S2S3	Coastal Dunes/ Beaches/ Small Islands	State List

### Species Description

The Dune Noctuid Moth has forewings streaked with white and greenish-gray, with a prominent black basal dash, hind wings mostly white in male, lightly shaded with greenish-gray in female. Wingspan 29-33 mm.

### Distribution and Abundance

There have been seven occurrences of the Dune Noctuid Moth documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Dune Noctuid Moth

### Habitat Description

The Dune Noctuid Moth inhabits coastal strand habitats on sandy soil, especially dunegrass grasslands. The larval host plant(s) are unknown.

### Threats

- Loss and degradation of habitat (dunegrass grasslands).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Dune Noctuid Moth (*Oncocnemis riparia*) Fact Sheet.

## Pitcher Plant Borer (*Papaipema appassionata*, State Threatened)

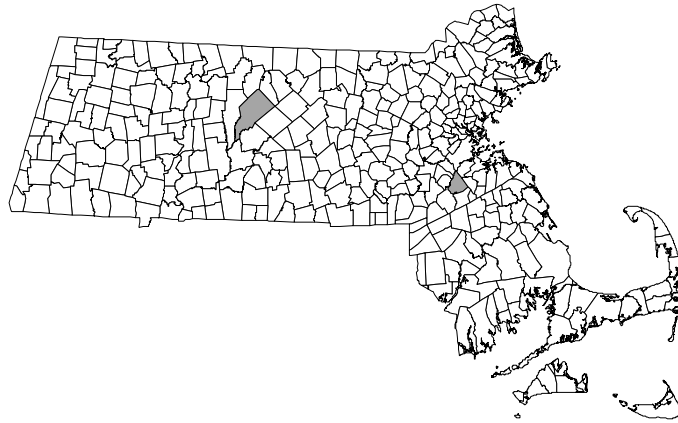
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1S2	Peatlands	State List

### Species Description

The Pitcher Plant Borer is a noctuid moth with brick-red thorax, matching color on forewings in basal area and terminal areas, median area straw-yellow, reniform spot large, white, orbicular spot of varying size, white, often with two identical spots below, hind wings pinkish-tan. Wingspan 28-38 mm.

### Distribution and Abundance

There have been two occurrences of the Pitcher Plant Borer documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Pitcher Plant Borer

### Habitat Description

Pitcher Plant Borer moths inhabit *Sphagnum* bogs with pitcher plants (*Sarracenia purpurea*). The larvae bore into and feed on the roots of pitcher plants, also consuming the foliage in later instars.

### Threats

- Loss of habitat (*Sphagnum* bogs) and disruption of natural hydrologic regimes.
- Insecticide spraying.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Pitcher Plant Borer (*Papaipema appassionata*) Fact Sheet.

## Ostrich Fern Borer (*Papaipema* sp. 2, State Special Concern)

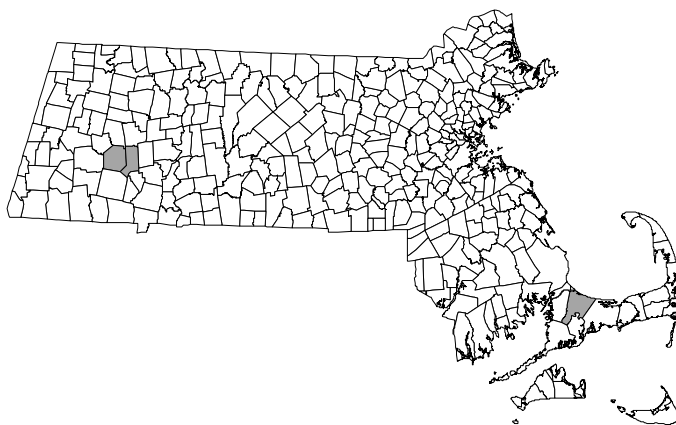
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S1S3	Riparian Forest	State List; Globally Rare

### Species Description

The Ostrich Fern Borer is a noctuid moth with forewing color generally orange in median area (occasionally lighter, straw yellow, or darker, brownish-orange), darker, brownish-orange in basal and terminal areas, reniform spot large, white, orbicular spot usually large, white, with two identical spots below, hind wings pinkish-tan. Wingspan 32-38 mm.

### Distribution and Abundance

There have been three occurrences of Ostrich Fern Borer documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Ostrich Fern Borer

### Habitat Description

The Ostrich Fern Borer moth inhabits floodplain forests and swamps with ostrich fern (*Matteucia struthiopteris*). The larvae bore into and feed on the roots and stems of ostrich fern.

### Threats

- Loss of habitat (floodplain forests and swamps) and disruption of natural hydrologic regimes.
- Insecticide spraying.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Ostrich Fern Borer (*Papaipema* sp. 2) Fact Sheet.

## Chain Fern Borer (*Papaipema stenocelis*, State Threatened)

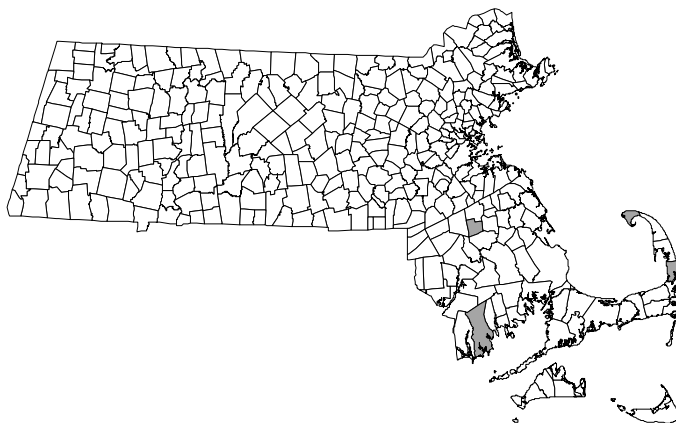
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S1S2	Peatlands, Shrub Swamps	State List

### Species Description

The Chain Fern Borer is a noctuid moth with forewing color orange, overlaid with brick-red in basal and median areas, often with violet in terminal area, postmedian line smoothly curved, dark red, reniform spot white, narrow and elongate, orbicular spot, white, often with additional elongate white spot below, hind wings pinkish-tan. Wingspan 32-38 mm.

### Distribution and Abundance

There have been six occurrences of the Chain Fern Borer documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Chain Fern Borer

### Habitat Description

Chain Fern Borer moths inhabit coastal plain acidic wetlands (bogs, shrub swamps, etc.) with Virginia chain fern (*Woodwardia virginica*). The larvae bore into and feed on the roots and stems of Virginia chain fern.

### Threats

- Loss of habitat (bogs and shrub swamps) and disruption of natural hydrologic regimes.
- Insecticide spraying.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Chain Fern Borer (*Papaipema stenocelis*) Fact Sheet.



## Water-willow Stem Borer (*Papaipema sulphurata*, State Threatened)

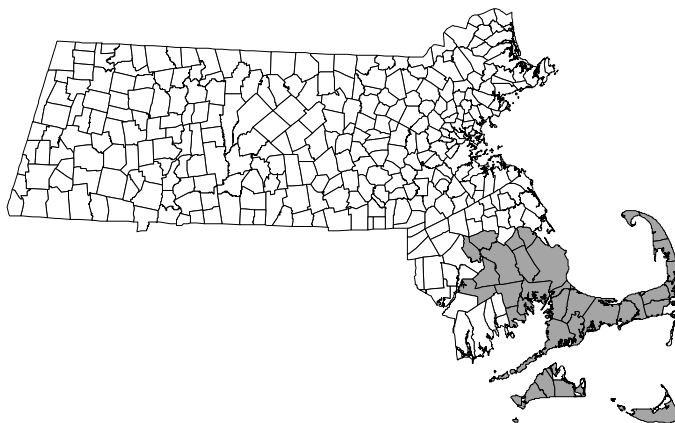
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G2	S2	Lakes & Ponds, Small Streams, Shrub Swamps	State List; Globally Rare

### Species Description

The Water-willow Stem Borer is a medium-sized noctuid moth, forewings straw yellow with purplish-brown shading in basal and terminal areas, reniform and orbicular spots straw yellow, outlined in purplish-brown; hind wings pinkish-tan. Wingspan 32-38 mm.

### Distribution and Abundance

There have been 81 occurrences of the Water-Willow Stem Borer documented in Massachusetts since 1980 (NHESP database, accessed December, 2004). This species is endemic to southeastern Massachusetts.



Massachusetts Towns with Recent Occurrences of Water-Willow Stem Borer

### Habitat Description

The Water-Willow Stem Borer moth inhabits shallow portions of coastal plain wetlands (swamps, edges of streams and ponds, swamps, abandoned cranberry bogs, etc.) with water-willow (*Decodon verticillatus*). The larvae bore into and feed on stems of water-willow.

### Threats

- Loss of wetland habitat and disruption of natural hydrologic regimes. Lowering of the water table on Cape Cod due to rapid urbanization is a potentially serious threat to this and other wetland species.
- Insecticide spraying.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. No date. Water-willow Borer (*Papaipema sulphurata*) Fact Sheet.

## Eastern Veined White (*Pieris oleracea*, State Threatened)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4G5	S1S2	Forested Swamps, Marshes & Wet Meadows	State List

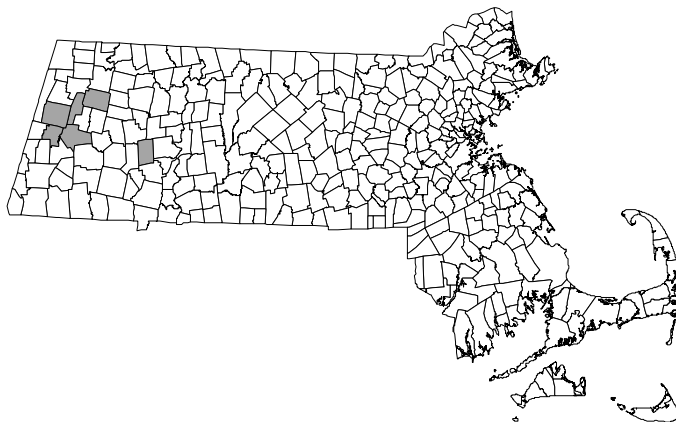
### Species Description

Eastern Veined White butterflies have white wings, underside of the hind wing with small, bright yellow spot at humeral angle and black streaks along veins in the spring brood; these streaks are faint, almost absent, in the summer brood. Wings of both broods are pure white above with black shading along costa and at apical tips. Wingspan 36-42 mm. Mature larva bright green with short, dense setae covering head and body.

Eastern Veined White butterflies are sometimes called Mustard Whites.

### Distribution and Abundance

There have been nine occurrences of the Eastern Veined White documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Eastern Veined White

### Habitat Description

Eastern Veined White butterflies inhabit undisturbed, mesic, deciduous or mixed deciduous/coniferous forest with sunny, wet openings (riparian floodplain, fens, wet meadows, etc.). Edges of low-intensity agricultural fields may also be inhabited, especially in the summer brood. Larvae feed on native mustards (Brassicaceae), including two-leaved toothwort (*Dentaria diphylla*), *Cardamine* spp., *Arabis* spp., and others.

### Threats

- Loss and degradation of habitat (deciduous or mixed deciduous/coniferous forest with sunny, wet openings).
- Garlic-mustard (*Alliaria petiolata*), introduced into the habitat of the Eastern Veined White in Massachusetts, is a plant upon which females will oviposit; however, this unnatural host is either lethal to larvae, or causes them to develop too slowly.
- Pesticide spraying.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Cotesia glomerata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. 1994. Mustard White Butterfly (*Pieris napi oleracea*) Fact Sheet.

## Pink Sallow Moth (*Psectraglaea carnosa*, State Special Concern)

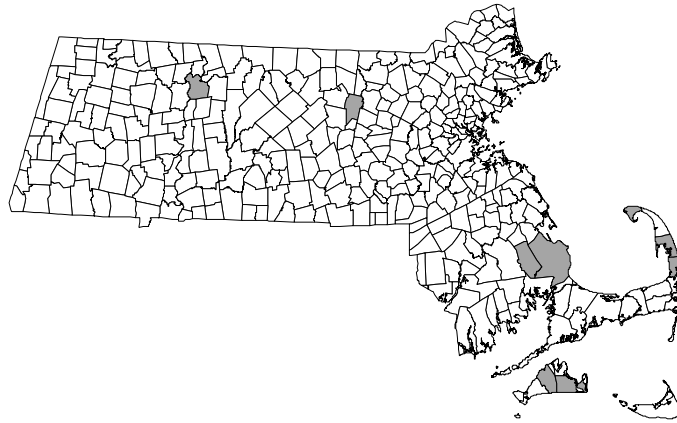
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S2S3	Pitch Pine/Scrub Oak	State List; Globally Rare

### Species Description

The Pink Sallow Moth has bright, reddish-pink forewings, solid in color except for faint yellow outlines of reniform spot, orbicular spot, and postmedian line. Hind wings cream-colored, lightly shaded with pink. Wingspan 34-38 mm.

### Distribution and Abundance

There have been 19 occurrences of the Pink Sallow Moth documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Pink Sallow Moth

### Habitat Description

The Pink Sallow Moth inhabits sandplain pitch pine/scrub oak barrens and heathlands, and possibly also ridgetop barrens and bogs; it is associated with ericaceous vegetation. Larval host plants are undocumented, but almost certainly include lowbush blueberries (*Vaccinium pallidum* and *V. angustifolium*).

### Threats

- Loss and degradation of habitat, especially pitch pine/scrub oak barrens and heathlands. This species' habitat preferences are for fire-dependent habitats, so fire suppression contributes to habitat loss.
- Pesticide spraying.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Pink Sallow Moth (*Psectraglaea carnosa*) Fact Sheet.

## Southern Ptichodis (*Ptichodis bistrigata*, State Threatened)

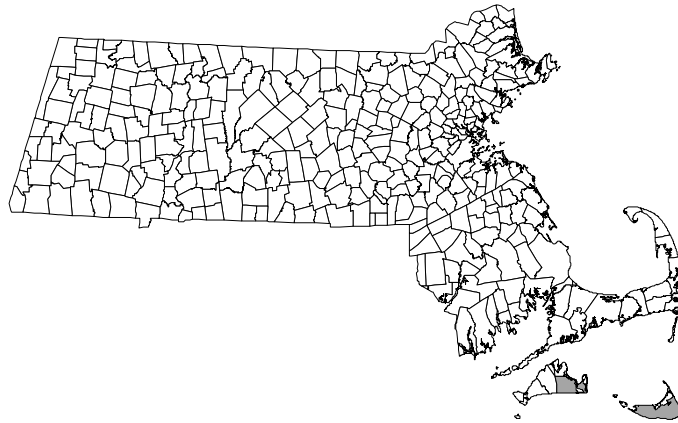
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3	S1S2	Grasslands, Pitch Pine/Scrub Oak	State List; Globally Rare

### Species Description

The Southern Ptichodis is a noctuid moth with grayish-brown forewings, antemedial and postmedial lines straight, reddish-brown edged with orangish-yellow. Hind wing nondescript, grayish-brown. Wingspan 27-32 mm.

### Distribution and Abundance

There have been four occurrences of the Southern Ptichodis documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Southern Ptichodis

### Habitat Description

The Southern Ptichodis inhabits grassy openings in pitch pine/scrub oak barrens and heathlands. Larval host plant(s) are undocumented, but wild indigo (*Baptisia tinctoria*) and other legumes (Fabaceae) are likely.

### Threats

- Loss and degradation of habitat (pitch pine/scrub oak barrens and heathlands); this habitat is fire-dependent, so fire suppression contributes to habitat loss.
- Pesticide spraying.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Southern Ptichodis (*Ptichodis bistrigata*) Fact Sheet.

## Orange Sallow Moth (*Rhodoecia aurantiago*, State Threatened)

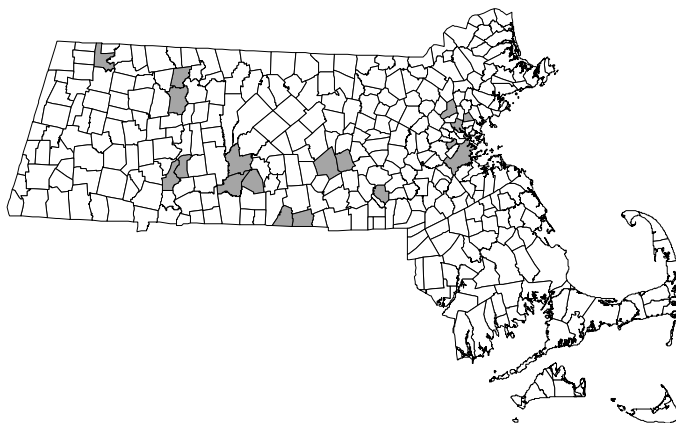
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S2S3	Upland Forest, Rock Cliffs/ Ridgetops/Talus Slopes	State List

### Species Description

The Orange Sallow is a noctuid moth, forewings orange with black spotting, margins pink in male, hind wings tan, margins shaded with pink in both sexes. Wingspan 24-28 mm.

### Distribution and Abundance

There have been 24 occurrences of the Orange Sallow Moth documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Orange Sallow Moth

### Habitat Description

The Orange Sallow Moth inhabits open, xeric, oak, oak/hickory, or oak/pine woodlands on rocky uplands. Larvae feed on the flowers, seed pods, and foliage of false foxgloves (*Aureolaria* spp.).

### Threats

- Loss and degradation of habitat (xeric and open oak woodland on rocky uplands). This habitat is fire-dependent, so fire suppression contributes to habitat loss.
- Pesticide spraying.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Orange Sallow Moth (*Rhodoecia aurantiago*) Fact Sheet.

## Oak Hairstreak (*Satyrrium favonius*, State Special Concern)

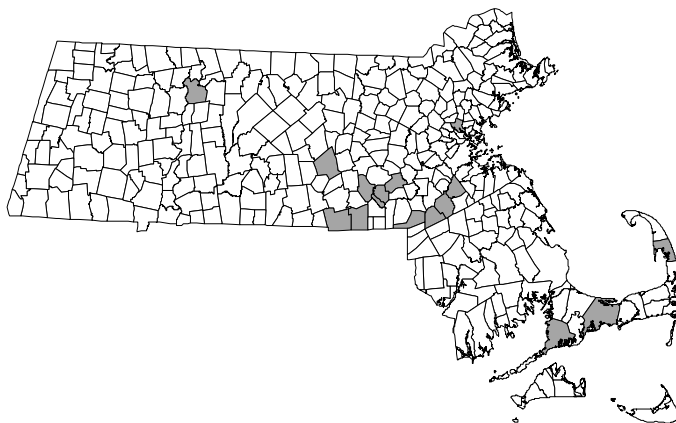
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S2S3	Upland Forest	State List

### Species Description

The Oak Hairstreak has wings dark brown above, often with round, rust-colored patch in middle of forewing and small spot of same color at outer angle of hind wing. Underside of wings tan with postmedial line of white and black crossing both wings and forming a “W” near inner margin of hind wing; hind wing with orange submarginal spots and iridescent blue patch flanked by two black spots at costal margin. Wingspan 26-32 mm. Larva of the typical slug-like lycaenid form, green with faint lateral line and pale dorsolateral dashes, with short, dense setae.

### Distribution and Abundance

There have been 19 occurrences of Oak Hairstreak documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Oak Hairstreak

### Habitat Description

In Massachusetts, the Oak Hairstreak inhabits xeric and open oak woodland and barrens on rocky uplands and sandplains. Adults are often found nectaring in dry, open, weedy or scrub areas, such as old fields, clearings, powerline or pipeline cuts, abandoned gravel pits, etc. New Jersey tea (*Ceanothus americanus*), dogbanes (*Apocynum* spp.), milkweeds (*Asclepias* spp.), and blueberries (*Vaccinium* spp.) are favored nectar sources, although others are used. Larvae feed on various oaks (*Quercus* spp.) across the species' range; particular oak species have not been documented in Massachusetts. Hosts recorded elsewhere and occurring in Massachusetts include white oak (*Quercus alba*), scrub oak (*Q. ilicifolia*), post oak (*Q. stellata*), and black oak (*Q. velutina*); other possibilities include dwarf chinquapin oak (*Q. prinoides*) and chestnut oak (*Q. prinus*). Newly hatched larvae feed on catkins; later instars feed on young foliage.

### Threats

- Loss and degradation of habitat (xeric and open oak woodland and barrens on rocky uplands and sandplains). This habitat is often fire-dependent, and fire suppression contributes to habitat loss.
- Pesticide spraying.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Oak Hairstreak (*Satyrrium favonius*) Fact Sheet.

## Spartina Borer (*Spartiniphaga inops*, State Special Concern)

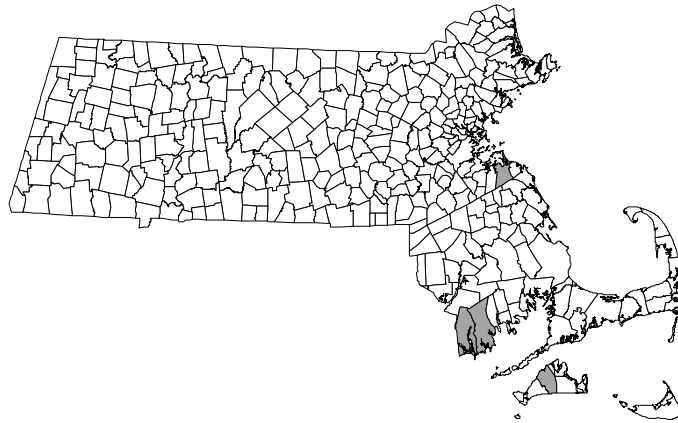
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G2G4	S1S3	Marshes & Wet Meadows, Salt Marsh	State List; Globally Rare

### Species Description

The Spartina Borer is a rather nondescript noctuid moth, forewings tan with dark gray spot in lower half of reniform spot; hind wings white. Wingspan 26-30 mm.

### Distribution and Abundance

There have been four occurrences of the Spartina Borer documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Spartina Borer

### Habitat Description

In the Midwest the Spartina Borer is found in mesic prairies; in Massachusetts, it typically inhabits the coastal marshes, where larvae feed on prairie cordgrass (*Spartina pectinata*).

### Threats

- Loss and degradation of habitat (coastal marshes).
- Harvesting of cordgrass (*Spartina pectinata*).
- Pesticide spraying.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Spartina Borer (*Spartiniphaga inops*) Fact Sheet.

## Faded Gray Geometer (*Stenoporpia polygrammaria*, State Threatened)

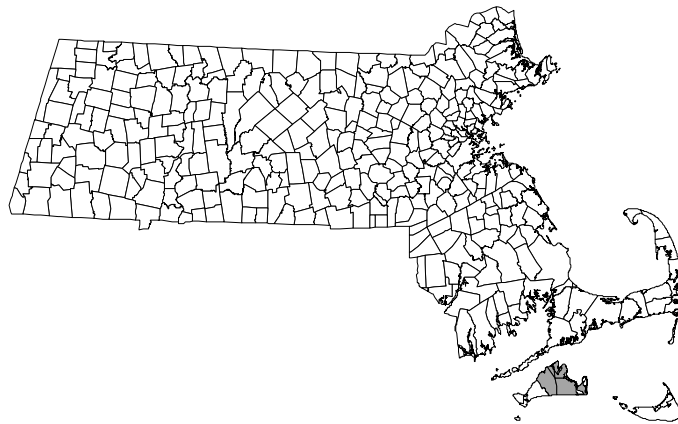
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G?	S1	Pitch Pine/Scrub Oak	State List

### Species Description

The Faded Gray Geometer moth has pale, whitish-gray wings banded and blotched with blackish-brown. Wingspan 32-36 mm.

### Distribution and Abundance

There have been eight occurrences of the Faded Gray Geometer documented in Massachusetts since 1980, all on Martha's Vineyard (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Faded Gray Geometer

### Habitat Description

On Martha's Vineyard, the Faded Gray Geometer inhabits scrub oak barrens and open oak woodland. Larval hosts are undocumented in Massachusetts, but are probably oaks (*Quercus* spp.).

### Threats

- Loss and degradation of habitat (scrub oak barrens and open oak woodland). This habitat is fire-dependent, so fire suppression contributes to habitat loss.
- Pesticide spraying.

### Reference

Massachusetts Natural Heritage & Endangered Species Program. In prep. Faded Gray Geometer (*Stenoporpia polygrammaria*) Fact Sheet.



## Pine Barrens Zale (*Zale* sp. 1, State Special Concern)

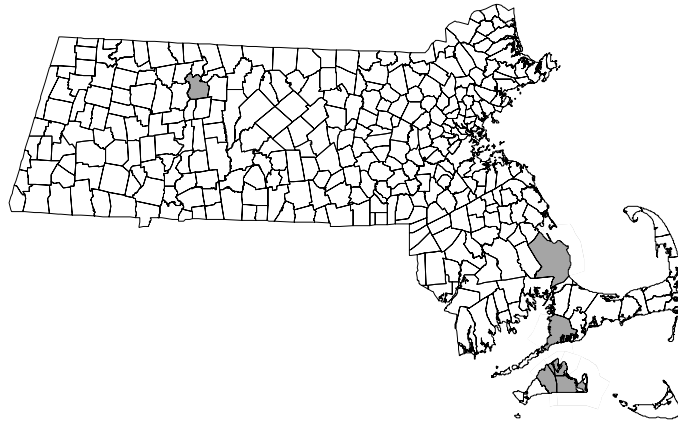
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S2S3	Pitch Pine/Scrub Oak	State List; Globally Rare

### Species Description

The Pine Barrens Zale is a noctuid moth, forewings mottled with dark and pale grays, shaded brownish-black basally and apically; antemedian line thick, brown; postmedian line thin, wavy; reniform spot narrow, elongate, yellowish-brown; orbicular spot small, black; hind wings banded with dark and pale grays. Wingspan 30-34 mm.

### Distribution and Abundance

There have been 21 occurrences of Pine Barrens Zale documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Pine Barrens Zale

### Habitat Description

The Pine Barrens Zale is found in sandplain pitch pine/scrub oak barrens, especially in scrub oak thickets. Larvae feed on scrub oak (*Quercus ilicifolia*).

### Threats

- Loss and degradation of habitat, especially sandplain pitch pine/scrub oak barrens. This habitat is fire-dependent, so fire suppression contributes to habitat loss.
- Pesticide spraying.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. No date. Pine Barrens Zale (*Zale* sp. 1) Fact Sheet.

## Pine Barrens *Zanclognatha* (*Zanclognatha martha*, State Threatened)

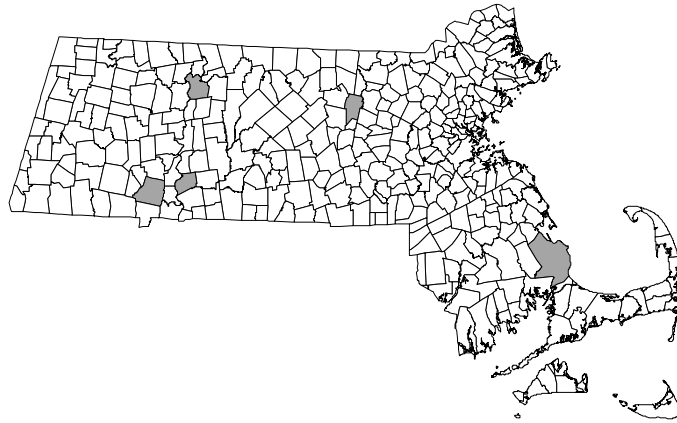
Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G4	S2	Pitch Pine/Scrub Oak	State List

### Species Description

The Pine Barrens *Zanclognatha* is a nondescript noctuid moth with dark brown forewings with darker brown, faint antemedial and postmedial lines, reniform spot small, dark brown; hind wings nondescript brown with faint discal spot. Wingspan 23-26 mm.

### Distribution and Abundance

There have been seven occurrences of the Pine Barrens *Zanclognatha* documented in Massachusetts since 1980 (NHESP database, accessed December, 2004).



Massachusetts Towns with Recent Occurrences of Pine Barrens *Zanclognatha*

### Habitat Description

The Pine Barrens *Zanclognatha* inhabits late-successional sandplain pitch pine/scrub oak barrens. Larvae feed on plant detritus, such as dead pitch pine (*Pinus rigida*) needles and scrub oak (*Quercus ilicifolia*) leaves.

### Threats

- Loss and degradation of habitat (pitch pine/scrub oak barrens). This habitat is fire-dependent, so fire suppression contributes to habitat loss.
- Pesticide spraying.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Bacillus thuringiensis*).

### Reference

Massachusetts Natural Heritage & Endangered Species Program. No date. Pine Barrens *Zanclognatha* (*Zanclognatha martha me*) Fact Sheet.

## Appalachian Coronet (*Hadena ectypa*, no state status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S1S3	Young Forests & Shrublands, Riparian Forest	Globally Rare

### Species Description

The Appalachian Coronet is a noctuid moth with dark forewings mottled with black, brown, and small amounts of yellow and white; reniform spot often obscured, but orbicular spot more prominent, round and shaded with yellowish-white; three large blotches of black, located over claviform spot, just distal of reniform spot, and at anal angle; subterminal line yellow, narrow but prominent; hind wings nondescript, grayish-brown. Wingspan 23-29 mm.

### Distribution and Abundance

In Massachusetts, the Appalachian Coronet is only known from the towns of Chesterfield and Huntington. Targeted survey work is needed to better document the distribution of this species in the state.

### Habitat Description

In Massachusetts, the Appalachian Coronet inhabits forest openings and edges with campions (*Silene* spp.), upon which the larvae feed.

### Threats

- Loss and degradation of habitat, especially riparian forest.
- Pesticide spraying.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### References

Forbes, W.T.M. 1954. *Lepidoptera of New York and Neighboring States, Part III*. Memoir 329. Cornell University Agricultural Experiment Station, Ithaca, New York.

Rings, R.W., E.H. Metzler, F.J. Arnold, and D.H. Harris. 1992. *The Owlet Moths of Ohio*. Ohio Biological Survey Bulletin, Volume 9, Number 2. Columbus, Ohio.

## Two-striped Snout Moth (*Macrochilo bivittata*, no state status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S1S3	Marshes & Wet Meadows	Globally Rare

### Species Description

The Two-striped Snout Moth is a noctuid with tan forewings, striated with white along veins, with brown apical dashes and two broad, rust-colored stripes, one long and extending from basal area along inner margin to outer margin, the other short and extending from median area to outer margin; hind wings nondescript, whitish-tan. Labial palps elongated into a “snout.” Wingspan 22-24 mm.

### Distribution and Abundance

In Massachusetts, the Two-striped Snout Moth is only known from the towns of Brimfield and West Bridgewater. Targeted survey work is needed to better document the distribution of this species in the state.

### Habitat Description

The Two-striped Snout Moth inhabits open wetlands including fens, marshes, and wet meadows. Larval host(s) are undocumented, but are likely grasses (Poaceae) and/or sedges (Cyperaceae).

### Threats

- Loss of wetland habitat and disruption of natural hydrologic regimes.
- Pesticide spraying.

### References

Forbes, W.T.M. 1954. *Lepidoptera of New York and Neighboring States, Part III*. Memoir 329. Cornell University Agricultural Experiment Station, Ithaca, New York.

Rings, R.W., E.H. Metzler, F.J. Arnold, and D.H. Harris. 1992. *The Owlet Moths of Ohio*. Ohio Biological Survey Bulletin, Volume 9, Number 2. Columbus, Ohio.

## West Virginia White (*Pieris virginiensis*, no state status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S3S4	Upland Forest	Globally Rare

### Species Description

West Virginia White butterflies have white wings, underside of the hind wing with pale gray streaks along veins; wings pure white above with gray shading along costa. Wingspan 36-40 mm.

### Distribution and Abundance

In Massachusetts, the West Virginia White is known from the towns of Adams, Amherst, Granby, Holyoke, Lee, New Ashford, Savoy, Shelburne, Sunderland, Tyngham, and Williamstown. Targeted survey work is needed to better document the distribution of this species in the state.

### Habitat Description

The West Virginia White inhabits undisturbed upland forest, especially rich mesic forest, typically in ravines where toothwort (*Dentaria diphylla*) grows along streams. Larvae feed on toothwort.

### Threats

- Loss and degradation of habitat, especially undisturbed, rich mesic forest.
- Pesticide spraying.

### References

Opler, P.A. 1998. *A Field Guide to Eastern Butterflies*. Peterson Field Guide Series. Houghton Mifflin Company, Boston, Massachusetts.

Pyle, R.M. 1981. *The Audubon Society Field Guide to North American Butterflies*. Alfred A. Knopf, New York, New York.

## Plain Schizura (*Schizura apicalis*, no state status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G2G4	S1S2	Pitch Pine/Scrub Oak	Globally Rare

### Species Description

The Plain Schizura is a notodontid moth with mottled gray forewings, brown shading at base and anal angle; lines black, indistinct; reniform spot black, crescent-shaped; hind wings white with black spot at anal angle in male, gray in female. Wingspan 26-30 mm.

### Distribution and Abundance

In Massachusetts, the Plain Schizura is only known from the town of Montague. Targeted survey work is needed to better document the distribution of this species in the state.

### Habitat Description

In Massachusetts, the Plain Schizura is restricted to sandplain pitch pine/scrub oak barrens. Larval hosts are undocumented in Massachusetts, but elsewhere this species feed on bayberry and gale (*Myrica* spp.), blueberries (*Vaccinium* spp.), poplars (*Populus* spp.), and willows (*Salix* spp.).

### Threats

- Loss and degradation of habitat, especially sandplain pitch pine/scrub oak barrens. This habitat is fire-dependent, so fire suppression contributes to habitat loss.
- Pesticide spraying.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### References

Covell, C.V. 1984. *A Field Guide to the Moths of Eastern North America*. Houghton Mifflin Co., Boston, Massachusetts.

Forbes, W.T.M. 1948. *Lepidoptera of New York and Neighboring States, Part II*. Memoir 274. Cornell University Agricultural Experiment Station, Ithaca, New York.

## Northeastern Pine Zale (*Zale curema*, no state status)

Global Rarity Ranking	State Rarity Ranking	Habitats	Conservation Concern
G3G4	S3S4	Pitch Pine/Scrub Oak	Globally Rare

### Species Description

The Northeastern Pine Zale is a noctuid moth with purplish-brown forewings; postmedial and antemedial lines jagged, black, indistinct; reniform spot prominent, dark brown, with rust spot immediately distal; hind wings brown with black postmedial line. Wingspan 30-34 mm.

### Distribution and Abundance

In Massachusetts, the Northeastern Pine Zale is known from the towns of Dartmouth, Plymouth, Rochester, and Wellfleet. Targeted survey work is needed to better document the distribution of this species in the state.

### Habitat Description

The Northeastern Pine Zale inhabits pitch pine scrub oak barrens and pitch pine forests. Larvae feed on pitch pine (*Pinus rigida*).

### Threats

- Loss and degradation of habitat, especially pitch pine/scrub oak barrens.
- Pesticide spraying.
- Biocontrol agents that affect non-target Lepidoptera (e.g., *Compsilura concinnata*).

### References

Forbes, W.T.M. 1954. *Lepidoptera of New York and Neighboring States, Part III*. Memoir 329. Cornell University Agricultural Experiment Station, Ithaca, New York.

Rings, R.W., E.H. Metzler, F.J. Arnold, and D.H. Harris. 1992. *The Owlet Moths of Ohio*. Ohio Biological Survey Bulletin, Volume 9, Number 2. Columbus, Ohio.